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ABSTRACT

A 5-month project was undertaken at the Western Interstate Commission for Higher Education to do a preliminary study of the implications of growth policy for postsecondary education. The decision to focus on this level of education was based on the belief that the existing problems of growth and its limits have become too urgent to be left to future generations to solve. Educational responses to the needs of growth policy are particularly crucial at the postsecondary level, for it is the current adult citizenry and leadership that must be affected. A major objective of this project was to develop a conceptual framework for action in the field of postsecondary education in response to the challenges posed by "limits to growth." While many educators are concerned about the social, economic, and ecological problems associated with population and material growth, there have so far been no detailed and comprehensive plans developed to clearly define, create, and disseminate the kinds of educational innovations these problems seem to demand. This working paper is an initial attempt to respond to this need. The chapters of the paper cover: the equilibrium society; changing institutions, roles and skills; needs for innovation in postsecondary education; recommendations for innovation and change; strategies for innovation and change; and comments on the working paper. (Author/PG)

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WORKING PAPER:

# THE IMPLICATIONS OF GROWTH POLICY FOR POSTSECONDARY EDUCATION

## A MODEL AND PROPOSED COURSE OF ACTION

U S DEPARTMENT OF HEALTH,
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# PREFACE TO THE WORKING PAPER

A five-month project was undertaken at the Western Interstate Commission for Higher Education to do a preliminary study of the implications of growth policy for postsecondary education. This study was supported by the Rockefeller Brothers Fund, and was directed by Drs. Lewis Perelman and William Bergquist.

By "postsecondary education" we mean not only formal undergraduate, graduate, and professional degree programs, but also fellowships, internships, in-service training, institutes, workshops, adult and extension educations, and educational programs carried on through various non-school organizations (libraries, museums, etc.), adult and extension education, mass media, etc. The decision to focus on this level of education was based on the belief that the existing problems of growth and its limits have become too urgent to be left to future generations to solve, and therefore that educational responses to the needs of growth policy are particularly crucial at the postsecondary level, for it is the current adult citizenry and leadership that must be affected.

A major objective of this project was to develop a conceptual framework for action in the field of postsecondary education in response to the challenges posed by "limits to growth." While many educators are concerned about the many social, economic, and ecological problems associated with population and material growth, there have so far been no detailed and comprehensive plans developed to clearly define, create, and disseminate the kinds of educational innovations which these problems seem to demand. This Working Paper is an initial, and extremely flawed, attempt to respond to this need.

Some comments we have received on the paper are included at the end.

# CHAPTER ONE: THE EQUILIBRIUM SOCIETY

## Background

In the past few years, widespread concern about the problems posed by the growth of human population, resource consumption, waste generation, and other forms of material economic activity has increased dramatically. Throughout the world there is now an urgent and increasing interest in the quantity and quality of growth. In the United States there has emerged what the Task Force on Land Use and Urban Growth, sponsored by the Rockefeller Brothers Fund, dubbed a "new mood", characterized not only by open questioning of the goals of endless material growth, but also by overt, organized, and forceful citizen action to slow or halt further economic "development" and population growth in an increasing number of communities and states.[1]

At all levels of government, from local to international, there is increasing recognition of the need for comprehensive, long-term growth policy, embracing such areas as population, community development, racial/ethnic integration, housing, land use, transportation, environmental protection, energy production and consumption, resource exploitation, employment, etc. Not only governments, but business, labor, educational, and many other kinds of institutions have become urgently concerned about growth-related problems like inflation, unemployment, declining school enrollments, inequality, etc.

Concern about the problems of growth in a finite world was perhaps most crystallized in the early part of this decade by two reports from MIT: Jay Forrester's World Dynamics[2] and the Club of Rome's The Limits to Growth.[3] Both of these studies bore the same central conclusion: that not only do limits exist theoretically for world population and material forms of economic growth but that these limits are, in fact, on the verge of being reached. As a result of the work of Forrester, Meadows, and the several other leading scholars who have been concerned with the "limits to growth', there has been generated a considerable amount of controversy and debate about the nature of such limits and their impact on the behavior of real-world systems.[4] What the debate itself seems to have demonstrated quite clearly, though, is that our collective knowledge about the causes and consequences of growth, and about how to achieve more balanced and stable alternatives to established patterns of material growth, is actually quite limited.

So even while the debate about "limits" goes on, it seems to us that there has now emerged a school of thought which in some sense has gone "beyond limits". The members of this emergent school are less exclusively concerned with the basic question of whether there are limits to growth than they are with developing detailed and viable alternatives to conventional patterns of growth (that is, with developing models of potential equilibrium systems) and effective means for making those alternatives realizable.

There seems to be a feeling generally held by the "beyond limits" school that education has a crucial role to play in the resolution of the problems and issues related to growth policy. As Forrester's work in System Dynamics suggests, and as the general failure of conventional approaches to growth problems clearly demonstrates, the development and implementation of effective growth policy requires more than just an attitude of concern. It also requires a far greater degree of competency in understanding and dealing with the behavior of complex social and ecological systems than the world's leaders and institutions now have. Clearly the cultivation of such competency is a task of paramount importance for our educational systems.

## Direction of the Paper

In attempting to define the implications of *Limits* for postsecondary education, we will not be engaged in a defense of the *Limits to Growth model*, but will instead adopt the stance of the "beyond limits" school. Assuming that the conclusions derived by the authors of *Limits* are correct, then what are the probable effects of these limits on various institutions, roles and skills that are currently in existence or that would have to be developed under conditions of an equilibrium state? What are the potential effects of *Limits to Growth* on postsecondary education, and, conversely, what are the potential effects of postsecondary education (in terms of research, instruction and institutional change) on the transformation of our global society from growth to equilibrium?

In our study of the implications of limits for postsecondary education, we wish to avoid giving primary attention to physical systems, and to the technologies that are associated with the transformation of physical systems. We will instead focus primary attention on social systems, looking at the way in which limitations in population growth and the consumption of material resources will affect the way in which people relate to each other, the way in which they find purpose and value in their lives, etc. We have made this decision to focus on social systems for two reasons: (a) a large proportion of the attention to growth problems to date has been devoted to physical systems, i.e. the problems of energy consumption, pollution, etc., and (b) the implications of limits to growth in terms of social systems are ultimately more profound than is the case with physical systems, both in terms of the extent of the changes that are implied for social systems, and in terms of the ability to effectively manage or effect change in social systems.

We will begin by defining in a preliminary manner some of the implications of limits to growth that we see for a number of different dimensions in the global system. We will then proceed to a determination of institutions, roles and skills that would be essential to a transformation of the global system from growth to equilibrium and that would be essential to the maintenance of an equilibrium society, once attained. The third step will consist of an examination of the role which postsecondary education might play in the establishment of these transformational and maintenance institutions, roles and skills. We will identify research programs, curricular reforms and institutional changes that need to be introduced in various existing or contemplated postsecondary educational institutions. Finally, make several

several recommendations and suggest several strategies for accomplishing the type of research, curriculum and institutional change programs proposed in step three.

## Characteristics of a Global Equilibrium State

In attempting to define the implications of limits to growth and growth alternatives for postsecondary education, it is essential that postsecondary education be considered not in isolation but rather in relationship with all or most of the other institutional changes that would be associated with transformation to an equilibrium state. It is essential, therefore, that the implications of limits be spelled out as fully as possible in a number of different parameters of a global system. We will attempt in a preliminary manner, to specify what a global equilibrium state might look like, and, as in the case of all projections (cf.Bell)[5], our statements are a mosaic of clearly deducible statements, of hopes and fears that reflect as much of our own values as the conclusions to be drawn from the *Limits* research, and unclearly specified means-ends relationships. Recognizing that these confusions and possible contradictions may exist in our projections, we nevertheless have proceeded to draw up a list of characteristics which in turn have implications for our definition of institutions, roles and skills for transformation to an equilibrium society. We therefore hope that the characteristics will be critically examined by the reader and not simply dismissed as an interesting but irrelevant exercise.

## I. Characteristics of Economic Systems

Under conditions of an equilibrium state, the consumption of energy per capita is assumed to be reduced in high energy consumption countries such as the United States.[6] Particularly in regard to consumption of nonrenewable energy sources (e.g. fossil fuels), an overall low rate of energy consumption is assumed. Only in the case of the consumption of renewable energy resources (currently limited to solar and perhaps fusion) is increase in energy consumption assumed possible. Such increases, however, could not exceed rates of renewability, nor could they adversely affect other segments of the global ecology. These limiting factors would of course, be less restricted for the use of solar energy. With decreases in the consumption of energy per capita, a premium would be placed in the equilibrium society on efficiency in the consumption of energy. Thus, unlike in the current social system of the industrialized world, maximum reward would be given not to production of energy, but to conservation of energy and to maximization of efficient use of energy.[7]

In regard to the use of material resources, an equilibrium state would require that all nonrenewable resources (e.g. metals) be used at a declining rate and eventually at a minimal rate. In the use of renewable material resources (e.g. wood products) a replenishment factor would have to be considered.[8]

Current rates of pollution would be reduced in an equilibrium society and would eventually have to be maintained at a minimal rate. Nonbiodegradeable biproducts from any production process would be eliminated. Pollution rates would be fixed with reference to the carrying capacity of the environment.[9]

An equilibrium system implies a minimization in the throughput of human and industrial capital. Industrial firms would maximize the durability of their products and minimize the capital/output ratio; i.e., increase the efficiency of their operations. Depreciation would cease to be a potential tax benefit; instead it would become subject to penalty.[10] Human capital would similarly exhibit a reduced throughput rate. Efficiency and effectiveness would be weighed more heavily than overall rates of production, and a major effort would be exerted to eliminate wasted human resources resulting from inadequate education, discrimination, unsafe working conditions, etc.[11]

The increased efficiency and effectiveness of the work force would necessarily be accompanied by an increase in the meaningfulness of the work. Incentive structures would be inherent to the work process itself, with the worker being actively involved in the decision-making process regarding the determination of work objectives, criteria of evaluation, promotion, etc. The distributive and productive functions of employment would be more separated, so that workers would be, to a greater extent, paid on the basis of their needs rather than on the basis of production. Craftsmanship would be encouraged, as would creativity in both design and execution of the production process.[12]

Under conditions of an equilibrium state, the autonomous 'personified" corporation could not exist, for all institutions in the equilibrium society would have to be responsive to objectives beyond their own personal survival. Small free enterprise institutions would be encouraged, as would public participation in the control of large enterprises. The "commonwealth" enterprise, in which workers essentially "own" their own company, would be encouraged as a vehicle for increasing initiative to work in an efficient and effective manner.[13] Investments, growth and interest would reflect and be responsive to values associated with equilibrium, such as efficiency, conservation, durability, synergy, quality, etc.

The use of land in an equilibrium society would be based not only on economic value, but also on aesthetic, ecological and recreational value. Land would not be "owned" in the traditional sense; rather, an individual or organization would assume "stewardship" for the land. A similar condition of "stewardship" would also prevail for the use of water and air.[14]

The agricultural segment of the economic system would (at least in the short-and-medium-terms) probably become more labor-intensive than it currently is in industrialized countries, and would reflect a changing value system in regard to the consumption of "low-efficiency" foods, e.g., meats and processed foods. Extensive use would be made of organic fertilizers, biological means of pest control, etc. In accordance with the concept of "stewardship", significant land redistribution would occur with greater control being given over to individuals and small cooperative groups. Increased use would be made of systems of reserve in the storage of agricultural products in order to stabilize supply of agricultural commodities.

In all segments of the economic sector of the equilibrium society, institutions and individuals would have to face the conditions of limited resources. Absolute growth would not be allowed if such growth resulted in significantly increased use of nonrenewable energy or material resources. Consequently, a greater premium would be placed on evaluation of existing economic institutions, for in many instances a new institution would only be able to start and expand at the expense of another institution. An equilibrium society would require a profound reorientation to the birth and death of economic institutions:[15] those institutions which ceased to provide a valuable and highly efficient function would be discontinued or significantly renewed, or would give way to another institution which could more effectively provide these functions or other, more valued, functions. This zero-sum game (maximization of competition) would not have to be "cutthroat" or destructive given the other dimensions of an equilibrium society (see following discussion) nor would the zero-sum game necessarily be applicable to institutions that were not making extensive use of nonrenewable resources. These latter institutions would be allowed to grow to meet expanding needs, yet hopefully not in the unplanned, wasteful manner of many contemporary institutions.[16]

## II. Characteristics of Human Relations and Quality of Life

The individual residing in an equilibrium society would probably experience multiple roles. He or she would be involved in several different roles at the same time and would assume a number of different roles over time. With an increase in role complexity, the individual would have to embrace a more flexible image of self and greater plasticity of "self-hood". Accompanying the changes in roles would be changes in identity resulting in a number of critical identity-transitions, rather than the usual single, adolescent-based transition (Erikson's identity crisis) which occurs in contemporary social systems.

Under conditions of an equilibrium society, leisure would become a more critical factor, partly as a result of a reduction in the differentiation between "work" and "leisure". Work would become more "playful", (i.e., increase use of simulations, role playing, etc.) while leisure would more frequently involve the active participation associated with work (e.g., the crafts, arts, invention, education, etc.), rather than the passive, non-involving "spectatorship" associated with much leisure in contemporary industrialized social systems (e.g. television, spectator sports, etc.). In an equilibrium society, leisure would become a vehicle for personal/cultural growth, especially under conditions where this growth does not involve the expenditure of extensive nonrenewable resources. Leisure would also become a vehicle for experimenting with and reheasing new roles, behaviors, products prior to their introduction as long-term, durable additions to the repertoire of the social system.

Privacy as well as leisure will become a factor of increased concern in an equilibrium society. A distinction would be made between "privacy" and "anonymity". Here, privacy refers to the right and capacity of an individual to select what he will or will not disclose to other people and to choose how and with whom he will associate. Anonymity refers to the conditions under which an individual cannot or is encouraged, via norms and precedent, not to disclose to or associate with other people. The latter condition exists for many people in many urban settings today. Under conditions of equilibrium, with production and residence being decentralized, there would be a greater opportunity for community, thereby reducing anonymity. Yet within this community, privacy could be preserved and is probably essential if equilibrium is to be established socially as well as physically.

The shifts in priority from production to stabilization, and from population growth to no-growth, would not necessitate a devaluing of human sexuality, but on the contrary a greater separation of the purely reproductive functions of sexuality from the dimensions of pleasure and interpersonal relationship. With emphasis on the role of sexuality in increasing the pleasure for individuals and in increasing the depth and stability of interpersonal relationships, new demands would be placed on educational and familial institutions to provide adequate sexual education to all members of society. Increased attention would also have to be given to research on new forms of contraception and to the development of new incentive systems that are compatible with reduced rates of reproduction.

The equilibrium state would require not only the throughput of energy and material resources to be reduced, but also the throughput of human lives to be reduced; i.e., not only birth rate would be reduced, but also lifetimes would be extended. Modern medical technology would probably allow for some increase in the average lifetime and increase the physical and mental vitality of people as they age. This reduction in throughput of human lives would result, during the transition period, in a large proportion of the population being of advanced age. Even after a state of equilibrium were reached, the proportion of adults and elderly in the social system would be greater than is now the case with greater throughput. Such changes in the distribution of population by age would have profound impact on other social institutions (e.g. recreation, education, medicine, etc.). (See discussion below.)

Interpersonal relationships, under conditions of equilibrium, would take on new forms in dealing with conflict. A social system which permitted only zero-sum games in at least one sector (economics), would have to discover new methods for conflict-management, given the fact that much conflict management in the current social system involves growth: i.e., giving resources to both conflicting parties (nonzero sum game). Conflict can also be assumed to generally increase during the period of radical transformation to an equilibrium society, thereby also demanding new forms of conflict management and resolution. Under conditions of an equilibrium society, conflict would play a vital role in both planning and implementation. With decreased throughput in energy and material resources and with an increased emphasis on efficiency and durability, decisions would be made with greater care and with decreased speed, thereby allowing for a greater expression of conflict and an increasingly appropriate role for consensus decision-making. Under such conditions, cooperation could be maximized, even when the decisions might result in the death of a specific institution in order for another institution to be established. The zero-sum nature of this latter institutional relationship would be tempered by the fact that no member of the social system would have his or her complete identity, let alone physical survival (food, shelter, etc.), dependent on the survival of one specific institution. Under conditions of equilibrium, conflict would continue to be ritualized (judicial system, sports, free enterprise)[17]; however, new forms of ritualization would be developed in order to reduce the destructive properties of conflict in areas where ritualization is currently only sporadically effective (e.g. international relations, marriage, parent-child relations).

With reduced throughput of human lives in the equilibrium state, health institutions would take on new roles. Preventive medicine would become relatively more important than curative or remedial medicine, thus bringing medicine more fully into issues of food, nutrition, social stress, etc. Health care would become more of a right than a privilege, and health would become more than the absence of illness - being defined in broader terms of quality of life. With decreased human throughput, the health profession would have to exhibit greater concern for the processes and consequences of aging and with the quality of life of the aged. Finally, an equilibrium system would require a new concern for environmental health and a total systems view of the relationship between physical and mental health and other aspects of the physical and social system.

The law enforcement institutions that would operate in an equilibrium society would be significantly affected and transformed under equilibrium. The criminal codes would have to reflect new value systems. The "victim" of crime would be redefined in terms of total systems. "Victimless" crimes, such as gambling, nudity and drug use, would be de-emphasized, whereas the newly-defined "victims" (e.g. rivers, recreationalists, total populations) would define new crimes. Similarly, the definitions of "deviance" and of "sanity" would be influenced by a newly emerging cluster of ecologically oriented values and priorities. "Deviance" in terms of temporary asocial behavior (creative, therapeutic, recreational) would be allowed in "sheltered" settings, while new forms of therapy would facilitate the transition of people through the temporary stresses associated with frequent role and identity change. Decentralization in governance structures (see below) and the development of small community units would allow for large discrepancies in norms between these social units, as well as allow for more personalized and community-based treatment of those individuals who are deviant with reference to the social unit with which they affiliate.

The structure of community would tend toward decentralization in an equilibrium society, for only through decentralization would the consumption of energy and materials be minimized and work become a nonalienating enterprise. Though this decentralization of community would lead to greater cohesion of the functioning social units and to greater stability in the society as a whole, it would not have to reduce the information flow between communities or move the society away from the essential global perspective of an equilibrium state. As a result of an extensive communication network (serving in many ways, as a substitute for transportation), members of local communities would also be able to transact and to identify with large regional, national, and global community units. This decentralized structure, coupled with maximized information flow, would also allow for the diversificantion and differentiation that is essential to the long-term stability of a social system, but would not produce the insularity which is common to many decentralized systems in contemporary societies.

In a similar manner, the family in an equilibrium society would serve a diversity of functions by means of a diversity of structures. With the separation of reproductive and child-rearing functions from economic, recreational, interpersonal and other traditionally family-related functions, the family system would be able to take on a variety of specialized forms to reflect and support the specific needs (social, emotional, sexual, etc.) of the two or more people who are participating in the family. One primary decision-making function that would have to be shared by the family unit with the broader social system is reproduction. The act of reproduction would no longer be considered purely the prerogative of the couple, but would instead become a shared responsibility with the society in which the couple lives. Similarly, the children of this couple would not be "owned" by the couple, but would instead be treated as individuals entitled to individual prerogatives and rights, and endowed with individual responsibilities.[18]

## III. Social-Ecological Structures

The technology of the equilibrium society would tend to be "soft", moving toward less consumption of energy and materials. These "soft" technologies might include new uses of windmills and sailboats, new uses of organic fertilizers and pest-control measures, new uses of natural events (e.g. forest fires).[19] Technology would tend to be defined in new ways: It would be seen as a means rather than end, as a subtle interplay between man and environment, with both parties playing a significant and determinative role. This new "soft" technology (Schumacher's "intermediate" technology) would emphasize the quality of labor - seeking to improve labor-assisting agencies and to improve work quality without necessarily replacing people in their work or increasing the gross output of people as productive units.[20]

New technologies would also tend to emphasize the cybernetic function that is necessary to any equilibrium state. Feedback systems would become more sensitive as a function of new technologies, and by means of this more sensitive control, social as well as physical systems would tend toward greater stability while providing greater possibility for experimentation and innovation. Cybernetic control would also place greater emphasis on the conveying of information and less emphasis on conveyance of energy.

Transportation systems would be significantly transformed in an equilibrium society. Transportation systems would be used relatively less extensively, being replaced in many instances by improved communication systems. Mass transportation systems would be given highest priority, with lower priority being given to the development of individualized, but minimally-consumptive transportation vehicles. Transportation systems that are used for recreation would be encouraged when not highly energy-intensive (e.g., sailboats, cross-country skiing). With the decentralization of communities, transportation systems of most kinds would be in less demand, thereby reducing the consumption of energy per capita.

Computers would play an essential role in an equilibrium society, especially in the acceleration of information flow and processing. The computer would also provide for the useful centralization of information. This centralization would have to be accompanied by new mechanisms for dropping out irrelevant or outdated information and, most importantly, be accompanied by new regulations to protect the privacy of individuals and small social units (families, friendships, therapeutic relationships, etc.) within the society.

The social structure of an equilibrium society would provide for the centralization of information as well as the flow of information to the point of optimal control. This contrasts with the current social system in which information tends to be highly decentralized and control tends to be highly centralized. In certain instances, information would be held and processed at a global level, for only at this level could total system-wide issues be treated, e.g., population control, control of production and consumption. An international governance system will have to provide control, as well as manage and interpret the information.[21] Conversely, other forms of information, while being stored in some centralized structure (e.g., network), will be primarily appropriate to a subsystem (e.g., a specific cultural unit), and decisions that might emerge from this information would be made by those individuals within the subsystem who were most fully acquainted with the information and who had managed its collection. The subsystem control might revolve around such issues as the design of a new community project, the selection of local officials the creation of educational institutions that meet local community needs, etc. These subsystems would correspond to functional units rather than being simply inventions of a centralized authority. A regional governance system, for instance, that has control over policies about water-usage would correspond geographically with the watershed region to which the water-usage question is pertinent. This structure of flexible regionalization reflects a more general policy in a equilibrium society of form and function being mutually influential and compatible.

The proposed social structure of the equilibrium society would provide not only for diversity and complexity of both form and function, but also mobility; i.e., not so much physical mobility, which can be highly energy-intensive, but social mobility in terms of multiple roles (forms) and responsibilities (functions). This mobility would allow for maximum efficiency in the use of human resources and provide individuals with a wide range of experiences that do not necessitate extensive travel or material consumption. The mobility would increase the problems of transition but also maximize the opportunities for new learnings and depth of self-definition.

Finally, the proposed social structure would provide "shelter" for deviance without condoning acts that were disruptive of an ecological balance. The military and security institutions in such a social structure would not be isolated but would instead be brought into the mainstream of community life. The "victim" of criminal acts or of intersystem aggression would become not the individual or the specific subsystem that was being attacked, but rather the entire social system, for conflict and aggression which serves no productive purpose is highly energy-intensive and potentially ecologically disruptive. The citizen-soldier would thus be involved in a daily process of preventing "unpeaceful" conditions from developing and of creating a social and physical environment which maximized payoff for cooperation and creative conflict over ideas rather than material resources.[22]

## IV. Culture, Aesthetics and Values

The new equilibrium society would require a radical transformation not only of the structures of society (economic, political, etc.) and the processes of society (e.g., conflict-management, work, information-flow), but also of the attitudes or, more basically, the consciousness of the individuals who would reside in this society. This new consciousness involves a broad systems-based conception of the ecological balance inherent in equilibrium, as well as a capacity to learn how to learn.

The new consciousness of the equilibrium society would be reflected in the artistic expressions of the individuals within the society. The arts would reflect the sociopetal (Sommer)[23] aspects of the social system, i.e., the movement of people toward community and away from anonymity, the movement toward privacy, yet away from alienation. Form and function would be compatible without one dominating the other.[24] The arts would become in general an increasingly valued enterprise as more people become involved in crafts, as quality of work took precedence over quantity, as growth became reinterpreted in terms of aesthetic expression rather than material production. Furthermore, with the increase in total number of adults and elderly, education in the arts would become of critical importance not only for children, but also for adults. The arts would also have to express the values and perceptions not just of the young, but also of the old.

Religious institutions would be faced with the prospect of embracing or reflecting new value systems, yet might also be faced with the prospect of increased or revitalized interest in religious expression and participation. A synthesis of eastern and western religious thoughts and forms could be anticipated, with the Judeo-Christian tradition moving away from a capitalist spirit toward a more "naturalistic" concept of man as a part of or partner with his environment. Religious institutions would become more diversified, each institution retaining or developing its own integrity in terms of dogma and ritual, yet respecting other institutional forms and participating in the overall global system associated with equilibrium (birth control, negative value associated with consumption, etc.).[25]

This broader, global value system would place emphasis on the welfare of all members of the society, recognizing that the effects of inequality on one part of the system profoundly affect all parts of the system. Value would be placed on community and participation, yet would also be placed on privacy and individuality (deviance, creativity, etc.). This balance of individual and community rights would be particularly important in the investment of stewardship but not ownership in the control of resources, and in the just distribution of resources to all individuals in the social system. Highest value would be placed on such dimensions as aesthetics, intellectual, affective and spiritual growth. Diversity in the pursuit of these growth goals would be encouraged, while conformity would be demanded in regard to restraints on material growth. Institutions would exist for the sake of goals other than sheer survival, goals reflecting or maintaining a significant value of the society. Individuals would not be affiliated with a single institution, neither would their survival depend on the survival of a sole institution; hence, institutions could be created and dismantled without a critical effect upon the individuals associated with the institution.

## CHAPTER TWO: CHANGING INSTITUTIONS, ROLES AND SKILLS.

The sketchy model of a potential equilibrium society presented in the preceding section represents a synthesis - and to a fair extent a consensus - of the views of many contemporary thinkers who have considered what the alternatives to our current industrial society might be like. The characteristics of this model have been selected on the basis of our understanding of what the essential requirements for a "state of global equilibrium" - as suggested by Limits to Growth and World Dynamics - imply for world society. A significant aspect of this model is that it is in many ways similar if not identical to the model of a "post-industrial society" augured by people like Daniel Bell[26] and others who for the most part reject the essential notion of "limits to growth". Is there any important contradiction then between the positions of those who speak of a "post-industrial society" and those who advocate an "equilibrium society"?

We believe that there is and that this contradiction is based on the distinction that can be made between the concepts of transition and transformation. That is, the difference is that between "moving across" and "changing form".

While futurists of the Bell school may envisage a future society which is in many ways similar to our model of an equilibrium society, they anticipate the emergence of such a society as the result of the smooth - and inevitable - convergence of existing trends of growth and "development". Thus, they view the problem of change from our current industrial-based society to the projected post-industrial society as mainly a matter of coping with an incremental and steady, though rapid and possibly "shocking", transition from where we are to where we are inexorably fated to be.

The views of the future of the Forrester/Meadows school are far different. Their projections of existing trends indicate the likelihood of overshoot and collapse of the world's social/economic/ecological systems unless major changes are made in the structure of those systems and in the policies which govern their dynamic behavior. In this view, then,a stable and sustainable society can be attained only through the conscious and radical transformation of the existing world system.

The difference between these two schools is therefore crucial, because it represents the difference between a passive and an active prospect of, and approach to, the future. Indeed, the contrast is so great that it can be viewed as being on the level of a Kuhnian "paradigm conflict".[27]

The "beyond limits" school is concerned then with two things. First, with alternative models to conventional growth-based systems. Second - recognizing that viable growth alternatives require to a large extent the radical transformation of existing systems - with devising the means for facilitating and managing such transformation. In the previous section we offered a sketchy and tentative model of an equilibrium society. Our major point in presenting this model is to demonstrate that a stable, sustainable world society would require the radical transformation of existing social/economic/ecological systems. The crucial question which this model raises is: how could such a transformation be achieved within the limited time frame that seems to be available? The remainder of this paper is devoted to making an initial attempt at answering this question.

## A. Transformation Institutions

In discussing the radical transformation of existing society to some kind of equilibrium society, it makes sense to begin at the level of the institutions which constitute and manage any society. By the term "institution" we mean essentially the same thing which Sarason refers to as a "setting"; that is: "Any situation in which a group of people come together for a purpose".[28] Thus an "institution" may be as small as a marriage or friendship between two people, or as large as a nation-state or a world government.

Our essential argument is that the radical transformation of society requires an institutional infrastructure which is capable of facilitating and managing transformation, and subsequently, of maintaining the desirable aspects of such transformation. This implies two things: first, the changing of most conventional types of institutions; and second, the creation of some new kinds of institutions. A list of conventional types of institutions is presented in Table O. The synoptic model of an equilibrium society given in the preceding section clearly implies important changes in all of these kinds of institutions. But major societal transformation also requires the creation of some new institutions, of a kind much more explicitly dedicated to the facilitation of transformation itself. These new institutions will be of basically two types: inter-institutions and meta-

## TABLE O

### CONVENTIONAL INSTITUTIONS

I. Government

- A. Executive
- B. Legislative
- C. Judicial
- D. Communications/Education
- E. Planning and Policy Analysis
- F. Tribune/Ombudsman
- G. Military and Security
- H. Prosecution and Defense
- I. Emergency
- J. Regulatory
- K. Corrections
- L. Political

II. Research

- A. Basic
- B. Applied

III. Economic

- A. Productive
- B. Service
- C. Financial
- D. Agriculture
- E. Extractive
- F. Storage (conservation)
- G. Labor
- H. Distributive

IV. Cultural

- A. Religious
- B. Aesthetic
- C. Recreational
- D. Philosophical/Intellectual
- E. Historical

V. Health

- A. Preventative
- B. Maintenance
- C. Curative
- D. Ameliorative

institutions. Inter-institutions are what Boulding has labelled "intersects",[29] and are institutions which in some sense fill the "cracks" between conventional types of institutions. Historic examples offered by Boulding are the Tennessee Valley Authority and the Port Authority of New York and New Jersey. Meta-institutions, on the other hand, in some sense span the boundaries between conventional institutions. To some extent they are of a higher "order of logical type" than conventional institutions in the sense that they are institutions-of-institutions. Our model of the meta-institution is based heavily on Schon's concept of the "network".[30] Important examples of the "network" offered by Schon are the "modern business/systems firm" and the (civil rights, anti-war, environmental, etc.) "Movement".

Schon calls institutions which are capable of learning from experience and transforming themselves in adaptive ways "learning systems".[31] It seems clear to us that the transformation institutions which will be required to change the world to some kind of equilibrium society will have to have many or all of the qualities of Schon's "learning systems". An important issue which we have not yet resolved between ourselves is whether the kinds of institutions required for a radical transformation of existing society will be the same kinds of institutions required for the maintenance of an equilibrium society. Certainly it seems necessary to us to continue to have transformation institutions in a viable equilibrium society, in order to facilitate the adaptive change, and hence creative evolution, of such a society. It may also be that, once an equilibrium state had been attained, the infrastructure of transformation institutions would have to be supplemented with an additional set of institutions patently designed to maintain the conditions of equilibrium. Exactly what these maintenance institutions would look like is as yet unclear to us, and it is likely that they can only be described in relation to a fairly detailed model of a specific equilibrium society. What is clear is that before a viable equilibrium society can be established, it will be necessary to establish a creative transformation society, comprised of institutions which are themselves transformational in nature.

In other words, the change from our current unstable state to a future stable and sustainable state cannot be made in a single great leap, but rather must be comprised of a number of intermediate steps. An initial schema for the sequence of these steps is offered in Figure I. The long-term goal is to create an equilibrium society, which means at least to create a set of institutions something like Schon's "learning systems", and perhaps also a supplementary set of maintenance institutions. The mid-term goal is to create a transformational system, and this means to create an infrastructure of transformation institutions. Because these institutions are an essential feature not only of the transformational period but of the resulting state of equilibrium as well, their creation must be the goal of paramount importance. In order to facilitate the creation and further transformation of the intermediate, transformational society, meta-institutions of various kinds will also be needed. But who will design, create, manage and change these new kinds of

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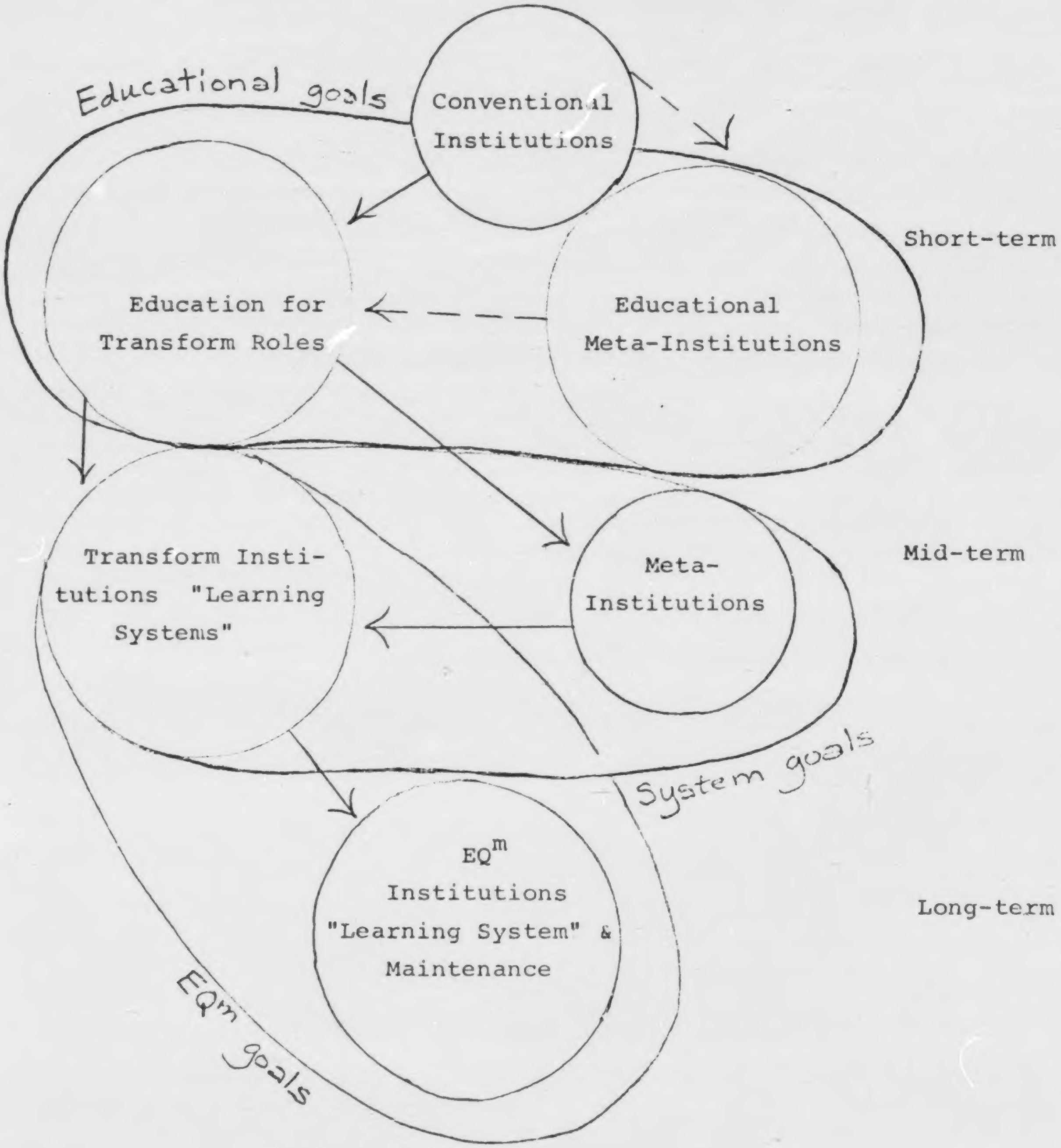
FIG.I

TRANSFORM SEQUENCE


Educational goals
Conventional Institutions
Short-term
Education for Transform Roles
Educational Meta-Institutions
Transform Institutions "Learning Systems"
Meta-Institutions
Mid-term
System goals
EQ$^m$ Institutions "Learning System" & Maintenance
Long-term
EQ$^m$ goals

institutions? Clearly a new educational system will be required in the short-term to generate the know-how and the competent manpower necessary for these tasks. So the very pattern of changing existing institutions and creating new kinds of institutions that is the global goal for the mid-term must be anticiptated and realized in the educational world in the short-term.

The remainder of this paper then will follow a logical sequence which is just the reverse of the transformational sequence presented in Figure I. In the previous section we have already outlined a model of an equilibrium society. In the next part of this section we will describe the institutional paradigm that will characterize the major institutions of both the equilibrium and transformational societies. After that we will discuss some of the kinds of new roles that people will be playing in the new kinds of transformation institutions. Then, in the next section we will suggest the kinds of skills that will be required for effective performance in these crucial transform roles. Following that, we will be drawing conclusions about what all of this implies for changing the current system of postsecondary education.

## B. Institutional Paradigms: Old vs. New.

The transformational society and subsequent equilibrium society will require not merely cosmetic changes in existing types of institutions but a whole shift in the dominant institutional paradigm. An institutional paradigm can be discussed in terms of several constituent parameters or characteristics and some of these are listed in Table I.

## TABLE I

## TRANSFORMATION OF EXISTING INSTITUTIONS

1. Goals
2. Technology/Technique
3. "Life-Support" Systems (Flow)
4. Physical Structures (Stock)
5. Personnel
6. Birth, Growth and Death Patterns
7. Constitution and Governance
    a) Internal relations
    b) Relations with other institutions and environment

INSTITUTIONAL PARADIGM

Table II provides an outline comparing, point by point, the old institutional paradigm of our current society and the new institutional paradigm which we believe will have to dominate the transformational and equilibrium societies. The table is self-explanatory. The last parameter of the paradigm, "Governance", is not compared because it is assumed to be implicit in all that comes before it. It should be noted that there are a number of new business, governmental and other kinds of institutions which are already based in part if not wholly on the new paradigm. We simply argue that this paradigm, or one like it, must come to dominate the institutional fabric of society if we are to make real progress toward the achievement of an equilibrium state.

## TABLE II

### Institutional Transformation

| OLD | NEW |
|---|---|
| **GOALS** | |
| Meta-goal (Mission): Growth/ Production; Exist | Meta-goal: Move system to state of no=growth (nonrenewable, limited, resources |
| 1) Maximize production at minimal financial cost | 1) Efficiency in use of human and material resources |
| 2) Cure stress/conflict (crisis management) solve problems; avoid conflict | 2) Prevention/anticipation of stress/conflict - prevent problems; embrace conflict |
| 3) Benefit central authority/ owner/voter | 3) Benefit entire system |
| 4) Primacy of production ('results') | 4) QOL for individuals-personal growth |
| 5) Survival at all costs | 5) Survival only while meeting other goals |
| 6) Defend against interference from environment (secrecy, PR, lobbying, dynamic conservation) | 6) Respond to needs (demands of the environment, advocacy, tribune/ ombudsman, openness, etc.) |
| **TECHNOLOGY/TECHNIQUE** | |
| 1) Function often follows form | 1) Form more responsive to needs of function |
| 2) Error-avoidance | 2) Error-embracing[32] |
| 3) Observe outcomes/products<br>Static behavior<br>Linear C-E | 3) Observe processes/relationships<br>Dynamic behavior<br>Non-linear C-E |
| ) Buearucracy | 4) Cybernetics |
| 5) Disjointed incrementalism | 5) Synoptic planning[33] |
| ) Cost accounting - MBO | 6) Evaluation - systems<br>- social accounting<br>- cost/benefit<br>- MBPA (MBO + S + Systems |

| | |
|---|---|
| 7) Hierarchy - central control | 7) Decentralization - peripheral control |
| 8) Center - periphery model (Rogers)[34] | 8) Network mode (Schon)[35] |
| 9) Routine functioning | 9) Non-routine functioning |
| 10) "Power-based" or "Avoidance" | 10) "Consensus" decision-making[36] |
| 11) Right-handed thinking | 11) Left- and right- handed thinking |
| 12) Uniformity by design | 12) Diversity by design |

## LIFE-SUPPORT SYSTEM (FLOW)

| | |
|---|---|
| 1) Assumption of unlimited resources (Sarason)[37] | 1) Recognition of resource constraints |
| 2) Attempt hegemony over flow sources (resources) | 2) Non-control or shared control of flow sources (resources) |
| 3) Dependence on constancy/growth of flow (birth, growth, death pattern) | 3) Adaptability to changes of flow (Birth, growth, death pattern) |
| 4) Institutions based on stock (tangible assets) | 4) Institution based more on flow (intangible assets) |
| 5) Free flow of energy/matter | 5) Restricted flow of energy/matter |
| 6) Restricted flow of information | 6) Free flow of information ("value of information increases as it is shared" - McHale)[38] |

## PHYSICAL STRUCTURE (STOCK)

| | |
|---|---|
| 1) Physical facility essential | 1) Physical plant less essential - communication |
| 2) Emphasis on size/extent of physical structure | 2) Emphasis on efficiency in use of resources (less = more) |
| 3) Form tailored to production | 3) Form more harmonious with personal growth, QOL |
| 4) Form indifferent to, obtrusive upon environment | 4) Form responsive to, harmonious with environment |

| | |
|---|---|
| 5) "Unfit" (McHarg) | 5) "Fit" (McHarg)[39] |
| 6) Emphasis on edifice (Sarason) | 6) Emphasis on setting (Sarason)[40] |

## PERSONNEL

| | |
|---|---|
| 1) "Organization Man" - loyalty to organization | 1) "Boundary Spanner"[41] - multiple constituencies, loyalties |
| 2) Designated leadership (status) | 2) Shifting leadership (function) |
| 3) Organizational unit = fixed, production group | 3) Organizational unit - 'roving' task force |
| 4) Operating unit - individual employee | 4) Operating unit = functional skill community |
| 5) Status credentials | 5) Functional credentials |
| 6) Low tolerance of ambiguity/conflict | 6) High tolerance of ambiguity/conflict |
| 7) Uni-sect (denominational) | 7) Inter-sect (inter-denominational) |
| 8) Conformity to organizational values | 8) Concern for personal values (values-clarification) |
| 9) Hierarchical governance. Non-participation - feudalism | 9) Non-hierarchical governance Participation - Commonwealth |

## BIRTH/GROWTH/DEATH

| | |
|---|---|
| 1) Linear concept of time - birth, death as initial and final | 1) Cyclical concept of time - birth, death as arbitrary points of reference |
| 2) Fate of organization determines fate of individual | 2) Individual's fate independent from that of organization |
| 3) Birth, death 'accidental' | 3) Birth, death controlled, planned for |
| 4) Non-zero-sum game w/other organizations - Conflict resolution through growth | 4) Zero-Sum game w/other organizations One's death - another's birth |

## C. Responses to the Need for Change

There are few people today who do not recognize that the world is in a critical state, who are unaware of the crisis generated by exploding population, vanishing resources, environmental decay, and escalating violence. Recognition of the need for major changes in the governance of society is fairly widespread. Yet the individual who recognizes the need for change may respond in a number of different ways to that need, and not all of these are productive. Indeed, Forrester tells us that most of the attempts to solve the problems of conventional institutions and social/ecological systems tend to be either unproductive or counter-productive.[42] Therefore, it is our premise that the mere fact that people have in many cases recognized and responded to the need for change carries no guarantee that such responses will necessarily be constructive.

Having given this matter some thought, we have come up with four models of what seem to us to be the major responses of individuals - particularly those in positions of leadership - to the need for change. These are summarized in Table III.

Model One is that of the monastic, brahmin, or what we simply call the "guru". The guru retreats from the world to lead a socially, spiritually, and/or ecologically idealized existence. Recognizing the corruption of the world, he pursues self-perfection and the only influence he cares to have on the world is by leading an exemplary existence.

Model Two is the jet-set reformer, the self-styled leader, and is perfectly exemplified by Welles' "Citizen Kane". The

## TABLE III

RESPONSES TO NEED FOR CHANGE

MODEL ONE: Monastic/ "Guru"/Brahman
Incremental LTG (the elite retreat
to the farm)/Maintenance/Conservation

MODEL TWO: Jet-Set/ "Citizen Kane"/Incremental
Bell. (The Elite fly over the problem--
the world as out-farm)/Maintenance

6

MODEL THREE: Transformation
Trans-form to LTG -- $EQ^m$ Society

MODEL FOUR: Revolution/Political Power
Che.

political and intellectual elite, who fly around the world helping to solve the problems which their position, affluence or status enables them to escape or avoid, generally fall within this model.

Model Three is the transformer, the person who is skilled at facilitating radical transformation in dynamically-conservative systems. Ralph Nader and John Gardner are notable examples.

Model Four is the political revolutionary, typified and symbolized by the late Che Guevara. To the revolutionary, positive transformation can only be achieved through the total replacement of the established power structure by a new, revolutionary power structure. And power cannot be won through reform, but must be seized, generally violently.

These four models can be further analyzed in terms of the various possible combinations of power and authority[43] (see Fig. II).

The guru, Model One, eschews both power and authority, and seeks to have no greater influence on the course of change in the world as a whole than the vicarious influence of exemplary living. Model Two, the "Citizen Kane" type, on the other hand, tries to command both power and authority, an impossible undertaking which ultimately leads to the erosion and loss of both. Authority is based on integrity, credibility and competency. Power corrupts; what it chiefly corrupts is integrity, credibility, and competency. Skipping to Model Four, the revolutionary lacks authority, but seeks to seize power. In fact, one might define revolution as the unauthorized taking of power. Of course the revolutionary may try to put on the illusory trappings

FIG. II

|  | POWER | NO-POWER |
|---|---|---|
| HORITY | II. | III. |
| THORITY | IV. | I. |

of authority provided by ideology before and during the revolution in order to recruit public support. But that illusion of authority is often quickly eroded once a revolutionary seizes power and is confronted with the problems of actually running a society.[44] Returning to Model Three, the transformer is generally wary of power and mainly tries to exert a significant influence over the course of change and the governance of society through the strength of his authority. This is totally misunderstood by people who promote a Nader or a Gardner for President; fortunately these men seem to understand well that the strength of their authority is in many ways greater than the power of the Presidency.

As may appear obvious from the above, the transformer is the model of response to the need for change which we find most promising and attractive. Therefore in all of the discussion which follows of transformation roles and skills we will be working almost entirely within the framework of this model.

## D. Transform and Post-Transform Roles

The transformer must be capable of carrying out a variety of different new kinds of roles which are implied by the new institutional paradigm described above. A number of these roles are described briefly in Table IV. There may be many more unique kinds of roles implied by the new institutional paradigm, but this list includes those that we consider to be of greatest significance. The significant fact about the roles listed in this table is that by and large there is currently no formal training provided for performance in these roles. Indeed, there has been little identification of the skills required to perform

## TABLE IV

### TRANSFORM AND POST-TRANSFORM ROLES

1. BROKER: match-maker, referral agent, developer of personal networks, connector (transaction, e.g. buyer/seller)

2. FACILITATOR: Foster development of networks, consultant, expediter, guide, connector (integrates people/groups with common interests), trainer, works toward autonomy of client, charge agent (ABS), convener, conflict manager

3. SYSTEMS EXPEDITER: Ombudsman, middleman, advocate, conflict resolver, (individual vs. system), red-tape cutter

4. "UNDERGROUND MANAGER": informal, underground network; anonymity, low-profile, "lurking"

5. NETWORK MANAGER: formal network, ensures flow of provision of resources, information; gatekeeper, convener, energizer, maintainer, expediter

6. MANEUVERER: project-basis, persuader, coercer[45]

7. OBSERVER: news analyst, diagnostician, cybernetics (feedback) labeller, short-term historian, independent

8. EVALUATOR: Instrument-developer, assessor, get information to feed back to action-authority; tester, judge, independent

9. TRANSITIONS ASSISTANT: assist individuals and organizations in making transitions/working under conditions of situational instability, stress, clarifying, supportive, challenging

10. FUTURIST: projects, generates alternatives; assesses possibilities, probabilities, conditional relations preferences

11. GADFLY: provacateur, conflict-instigator, charge agent

12. NETWORK BUILDER: connects the nodes; catalyst

13. BRAKESMAN: pattern-maintenance, flyweel, ritualist

14. CONFLICT MANAGER: works against "schismogenesis" (Bateson); peacemaker, arbiter, negotiator

15. WHISTLE-BLOWER: (Nader) (e.g. Ellsberg) profices feedback from setting to environment that circumvents official channels of authority/censorship

these roles effectively, and, in fact, there is probably little formal recognition that many of these roles even exist within the conventional institutional paradigm.

Perhaps of greater importance than the list of the transform roles themselves is our typology of these roles which is summarized in Figure III. In this matrix, we have arrayed the various roles described in Table IV under four categories of institutional types: intra-institutional, inter-institutional, meta-institutional, and non-institutional. Following on Schon's analysis, we feel that some of the most important transform roles fall under the meta-institutional or "network" category. The roles within the third box of the matrix all more or less entail the spanning of boundaries among institutions.[46] To some extent, these roles may also occur within the inter-institutional category, but we also recognize that there are one or two roles unique to Boulding's "intersects". While these various boundary-spanning roles are, we feel, essential to the effective transformation of conventional institutions, there are also some important roles that must be played within institutions, that are required to make those institutions creative "learning systems"; these are indicated in the first box. Also, after some reflection, we concluded that there were some extremely crucial transform roles which did not really fall within the institutional paradigm at all, and which were in a significant sense "non-institutional". For our purposes, we have defined institutions as situations in which people come together for a purpose. One characteristic of the roles subsemed under this fourth category is that they do not

## Figure III

## TYPOLOGY OF TRANSFORM ROLES

| INTRA-INSTITUTIONAL I. | | INTER-INSTITUTIONAL II. | |
|---|---|---|---|
| Integrator | | | |
| Whistle-blower | Inventor | Intersect Manager | |
| Challenger | Innovator | Consortium Manager | |
| Brakeman | Diffusor | | |
| (Subsystems) | | (Systems Cracks) | |
| **META-INSTITUTIONAL III.** | | **NON-INSTITUTIONAL IV.** | |
| Evaluator | Network Builder | Transistions Assistant | |
| Facilitator | Conflict Manager | Futurist | Prophet |
| Network Mgr. | Gadfly | Observer | Poet |
| Broker | Systems Expediter | Historian | Clown |
| | Underground Mgr. | | |
| | Maneuverer | (Metaphor-Generation A- or Meta- Purpose) | |
| (Networks) | | | |

necessarily require their practitioners to come together with others. A second characteristic, perhaps more significant, is that they are roles which in an institutional sense are without purpose, or at least whose purpose is on a different level than that of an institution. Except for the transitions assistant, all of the roles mentioned in the fourth box have as their most general purpose the generation of metaphor, the creation of ideas. Without these rich sources of metaphors, ideas, and insights to draw on, all other transformation roles would quickly become impotent. The transitions assistant is slightly different, and is actually a kind of interface role between the institutional and the non-institutional. People or institutions in transition to some extent at least have lost their senses of reality, value, and competency. An important part of the t.a.'s role is to help restore these senses to those who have become thus disoriented by making available to them the resources of the metaphor-generators.

Also, as indicated in Figure III, these four institutional types can be related to the concepts of power and authority, the influence of the first two being more dependent on power, and that of the second two being virtually totally dependent on authority.

## Skill Profile

In the previous section we indicated how we think institutions will have to change if the transformation to an equilibrium society is to be effected. Consistent with the kinds of changes implied by a new institutional paradigm, we indicated some important new kinds of roles that competent "transformers" would have to play within this new institutional paradigm. This brings us now closer to the level of educational goals for the near future, as indicated in Figure I. In order to define those goals, we must begin by sketching out a profile of the skills that an effective transformer should have in order to perform well in the kinds of new roles that we described above. Clearly, many of the individual roles which we mentioned in the previous section require some fairly specialized skills that are unique to a particular role. We will not be concerned in this discussion with these special skills. Rather, we will talk here about the skills of the transformer that are relevant to most if not all of the various roles listed above. And we will discuss these general skills on two levels: enabling skills and performance skills. Enabling skills are those which are in some sense prerequisite to actual performance as a transformer. They are skills which enable one to be a transformer. Performance skills are those which are more actively employed in the carrying out of the transformer's craft. The distinction between these two sets of skills is necessarily fuzzy but still may be of some value in organizing the discussion which follows. Parenthetically, we should add that we are using the term "skill" in a very broad sense to refer to competencies not only on the level of instrumentality but also on the higher levels of values and reality images.

### A. Enabling Skills

Here we will present a list of several skills that we think enable an individual to be an effective transformer. Some of the items in this list are more specific than others, and the list itself is only a tentative first approximation of what we think the skills of a competent transformer should be. A more accurate and detailed list awaits further research, experience, and insight. The order of skills presented here is of no special significance, except that we try to go from more general to more particular.

### 1. Bateson's Four Equilibrium Skills

In July 1974 we had an extensive conversation with Gregory Bateson on a variety of subjects relevant to this report. Bateson was not particularly optimistic about the possibility of creating an equilibrium society, but, we asked him, supposing such a society could be created, what would be the most essential skills required to do so? Bateson came up with a list of four skills - what he called cultural "components" - which would be essential.

The first of these was what Bateson called a pessimistic realism. In other words, an ability to recognize and accept critical problems realistically, without, on the one hand, retreating into euphemism or, on the other, sinking into despair.

The second Bateson called a "slow-down" component. At the societal level, this meant getting the currently explosive rates of change and growth back to more tolerable, manageable levels. Individually, it meant learning how to manage transitions to keep them within humanly tolerable bounds, avoiding, at the extremes, both stagnation and future shock.

The third was resiliency. The will to go on living in the face of opposing, and sometimes overwhelming odds. The ability to rebound from defeat.

And the fourth skill or component was creativity. Particularly at the high level of creativity which can produce beauty in the midst of ugliness, which can educe form from chaos.

Bateson added a crucial corollary to this list of skills or cultural components essential to the creation of an equilibrium society: only the complete set works; that is, the absence of any one is pathology.

2. Perelman's 'Softworld' Skills

In his forthcoming book,[47] Dr. Perelman discusses two fundamentally different perspectives on, or approaches to, the problems of global, ecological crisis. He calls these the "hardworld" and "softworld" perspectives (based on earlier conceptions of Jung and Bateson) and argues that the former is associated with the cause of the crisis, and that the latter is at least necessary if not sufficient for its cure. The "softworld" perspective was an initial attempt at articulating a paradigm for what we have here called transformers, and implies several important enabling skills.

The first of these - and the one which to some extent embraces all of the others - is what can be called holistic thinking. That is, an ability to recognize and to deal with all of the important components and feedback relationships of complex systems. An ability not only to think rationally about the interactions among the parts of a complex system, but also to develop an intuitive "feel" for the dynamic behavior of such a system, as a whole. Holistic thinking implies a concept of reality which spans artificial boundaries and which projects to the most distant horizons of time. This kind of thinking requires an astute grasp of a number of crucial concepts, including: system, information and entropy, communication, feedback and control, simple and complex systems, synergy, connectedness, learning, and reification.

The second is a kind of flexibility. That is, the antithesis of dogmatism. The ability to design, create, manage, and change systems, as opposed to the inflexible "belief in" a given system.

The third skill might be called many things but perhaps sophistication best expresses it. This is in contrast to the tendency to ascribe critical problems to simple causes and to search for simple cures. The effective transformer must be more sophisticated. He must be able to perceive the very complex causes that underlie most critical problems and to design treatments that are tailored to that complexity.

The fourth is a projective responsiveness. The ability to avert crises by planning ahead. Shaping the future rather than simply reacting to it.

The fifth is a kind of technological skepticism. This is not merely the anti-technological bias of some elements of the "counter-culture". It involves, first of all, a constructively critical attitude toward technological innovation. This requires the ability to make crucial value and political judgments about whether a given technological change should or should not, will or will not, be proliferated. Secondly, it involves the recognition while technology may often make a useful contribution to the solution of many problems, there are virtually never any completely technological "fixes"; indeed, that technology by itself is rarely the major part of the solution to any significant problem in a complex social/ecological system.

The sixth is responsibility, following the definition of philosopher Charles Frankel: "A decision is responsible when the man or group that makes it has to answer for it to those who are directly or indirectly affected by it".[48] So responsibility, as a skill, not only involves the individual's capacity for empathy, or "sense of responsibility", but also involves the ability to design and create systems in forms that at least permit and hopefully require responsible behavior.

The last is peacefulness. Following the thinking of Adam Curle,[49] something far more positive is implied here than merely the absence of overtly aggressive, violent behavior. Peacefulness involves being at peace with oneself, enjoying peaceful relations with one's family, friends, colleagues, community, etc., and, perhaps even beyond these, the skills of the peace-maker.

3. Michael's Pre-Pequisites for Future-Responsive Social Learning.

Michael suggests that people working in the new kinds of institutions we described above should learn how to do at least six things:

First, "live with and acknowledge great uncertainty"

Second, "embrace error"

Third, "seek and accept the ethical responsibility and the conflict-laden interpersonal circumstances that attend goal-setting".

Fourth, "evaluate the present in the light of anticipated futures, and commit themselves to actions in the present intended to respond to such long-range anticipations".

Fifth, "live with role stress and forego the satisfactions of stable, on-the-job, social group relationships".

Sixth, "be open to changes in commitments and direction, as suggested by changes in the conjectured pictures of the future and by evauations of on-going activities."[50]

4. Communication Skills Learning how and when to use such interpersonal communication skills as paraphrase (ensuring and understanding of the other person's state), behavior description (ensuring the other person's understanding of our perceptions), description of feeling (ensuring the other person's understanding of our state), perception check (ensuring our understanding of another person's perceptions) and freeing communication (ensuring the freedom in states and perceptions of both communicators)[51] . A conceptual grasp of communication systems (e.g. wheel vs. net) and processes (e.g. metacommunication) if also essential.

5. Self-Management Developing a personal capacity to take responsibility for one's own perceptions, emotional states and behavior. Self-management involves a recognition and emotional internalization of the concept that each individual is in charge of his or her own life with reference to choosing or not choosing to be a "victim". This skill is particularly important for

individuals working in various helping and transforming roles, as a means of sustaining a tolerance of ambiguity, risk, error and failure.[52]

6. Giving and Receiving Feedback Creating conditions for and participating in the cybernetic process of effective social systems. Effective feedback includes: (a) skills in observing the behavior of complex social systems; (b) skills in providing a distillation of the observations made of these systems to the requesting person or institution being observed with a minimal amount of evaluation, bias or judgment; (c) skills in receiving observational feedback in a nondefensive manner, and (d) skills as both a sender and recipient of feedback in establishing data selection criteria to maximize the effectiveness of the feedback.

7. Physiological Control With the recent development of biofeedback mechanisms, individuals are increasingly able to control specific physiological functions (e.g. heart rate, blood pressure and level of electro cortical activity). More generally, relaxation techniques, ranging from systematic desensitization to various forms of yoga, are now available to an increasing number of individuals who wish to relax, either to control stress or to create conditions for creativity or reflectivity. Given the emotional stresses and demands for creativity associated with transformation, it is highly desirable that individuals learn these physiological control procedures.[53]

8. Learning II (Bateson and Perelman) Learning or cultivation the skills of various forms of Learning I. Learning to transform Learning I systems.[54] Learning patterns of what Bateson calls "punctuating experience", which is equivalent to acquiring so-called character or personality "traits". A specific Learning II objective related to the cultivation of ecological consciousness is learning the art of "grokking"[55] or "thinking in systems".

9. Learning III (Bateson and Perelman) Learning III throws open the largely unexamined premises of Learning II to question and to change. It is at the level of Learning III that significant expansion and transformation of consciousness occurs. The crucial objective of Learning III is not just the redefinition of the "self" but, beyond that, is attainment of a conception of "self" which is implicitly fluid and transmutable.[56]

10. Verbal and Media Literacy Though new means of conveying information (television, computers) will increasingly influence patterns of formal communication, traditional means of formal communication (writing, speech) will not diminish. Increases in media literacy (ability to convey information via television, to program computers) will help meet the demands for increased communication in an equilibrium society, but will not reduce the need for written and spoken communication.

11. Conception of Time The profound paradigm shifts that are implied in a transformation to equilibrium necessitates a greater degree of diversity and flexibility in concepts of time. Time must be viewed as a flexible, rather than a rigid parameter. Time must be stretched to incorporate long-term planning, and to encourage the consideration of long-term consequences of actions taken for short term benefit (Tragey of the Commons).[57] On certain occasions, time must be viewed as a linear phenomenon ("we cannot turn back irreversible ecological processes"). On other occasions, time must be viewed as a cyclical phenomenon ("processes tend to repeat themselves in closed systems"). In this sense, time, like light, must be viewed as two quite different phenomena, neither of which is more valid than the other.

12. Fantasy Recent research on fantasy indicates that it serves several important problem-solving functions,[58] as well as providing a basis for creativity and personal insight. Individuals who will be involved in long-term planning programs and/or will be performing meta-institutional roles, will be most effective if capable of using fantasy in a productive way. Furthermore, fantasy can be a valuable complement to biofeedback and relaxation as a means of reducing stress.

13. Values Clarification Under conditions of rapid societal change in roles, institutions, mores, norms and structures, values become highly vulnerable to change, manipulation, distortion and isolation from behavior

(cognitive dissonance). The constant clarification of values is essential to any effective social action, as well as to personal life planning.[59] Several other enabling skills have been identified by us, but need further development in subsequent drafts.

14. Risk-tolerance
15. Interpersonal competencies (Argyris)[60]
16. Competencies in Learning from Experience (Torbert)[61]
17. "Chutspa"
18. Disclosure (Jourand)[62]
19. Certain Cognitive Styles (Field Independence, Cognitive Flexibility, etc.)

B. Performance Skills

In addition to the general skills just described, there are some additional skills that are more actively brought into play in the actual performance of the various roles of the transformer.

1. Problem-Solving: Meadows Dennis Meadows has listed several skills whish effective problem-solvers should have.[63] Some of these overlap with others mentioned above, but the full list bears repeating here.

First, is the recognition that the future can be deliberately created, and need not be just passively experienced.

Second, is an intuitive appreciation for the causes and consequences, the costs and benefits of material growth and social change.

Third, is the ability to use formal, methodological tools for making useful statements about the future consequences of current actions.

Fourth, is an understanding of how complex systems change over time.

Fifth, is an understanding of the notion of uncertainty, and skill in making the best use of partial information.

Sixth, is skill in the design of experiments to gather more information and in techniques for analyzing data in order to identify causal relationships.

Seventh, an ability to deal with the time dimension explicitly. This means understanding the long-term consequences of current actions and having an ethical basis for making choices that may entail short-term benefits and long-term costs.

Eighth, the ability to make choices which inevitably involve compromise.

Ninth, is a realistic understanding of the motivations and the leverage points in industrial and political bureaucracies.

Tenth, is a conception of goals that adapt slowly over time in response to new information. (MEADOWS & PERELMAN)

Following is a list of other suggested skills, that are yet to be developed:

1. Boundary-Spanning (Michael)[64]
2. Error-Embracing (Michael)[65]
3. Conflict Analysis
4. Problem Analysis (Wallen)

5. Negotiation/Bargaining
6. Radicalism (Alinsky)[66]
7. Decision-Making (Blake & Mouton[67], J. Hall[68])
8. Team-Building (Sheppard)
9. Empathy (Radar" in M*A*S*H)
10. Expanded Management-by-Objectives
11. Consultation/Intervention Skills (Argyris[69], Schon)[70]
12. Constitution-Making (Sarason)[71]
13. Intersect Management: Boulding.[72]
14. Designing Synergetic Settings Especially creativity, play
15. Simulation: Design and Implementation.
16. Futuristic Methodologies.

    --system dynamics

    --Delphi techniques

    --forecasting

    --projection

    --brainstorming

    --cross-impact analysis

    --synectics [73]

    --brain dumping
17. Organizational Analysis and Construction. (e.g. matrix) Leverage points and dynamics.

# CHAPTER THREE: NEEDS FOR INNOVATION IN POSTSECONDARY EDUCATION

New institutions, roles and skills have been identified as essential to significant transformation from a growth-oriented, industrial society to a non-growth-oriented, equilibrium society. These new institutions, roles and skills will be developed as a result of total systems responses. No one institution, in isolation, will be able to effectively bring about or manage the transformation process. The discussion which has preceded this section has profound implications for major change and innovation in the field of postsecondary education.

In this section, we will discuss what we feel are some of the major changes that limits to growth, the need for effective growth policy, and the transformation to an equilibrium society imply for postsecondary education. We will discuss these required innovations first in terms of research, second in terms of curriculum and third in terms of institutions.

## A. Research Needs

The previous sections of this working paper implicitly raise some critical questions about new social structures, technologies, values-reorientation, etc. Each of these topics provides the basis for a number of large scale research projects, and points to the need for more research on the causes and consequences of growth and equilibrium. It is essential that members of the postsecondary educational community begin to respond to these research issues, for our society will develop the capacity to plan for effective transformation to equilibrium only when we possess valid and useful knowledge about these critical issues. Following is a more specific set of recommendations concerning new priorities and directions for research carried on in postsecondary education institutions.

## Need #1: Balancing of Priorities in Research

In recent years in the United States and elsewhere, there has been a growing emphasis on supporting applied research at the expense of basic scientific research. The Nixon Administration, for example, tried to create a so-called "War on Cancer" by transferring government support funds away from many areas of basic medical and biological research and toward research which is explicitly applied to the treatment of cancer. Most scientists have condemned this tactic as pernicious; we agree. We feel that the crucial role of learning and knowledge in the creation and maintenance of an equilibrium society--both as a means for facilitating equilibrium and as an end in itself as a major component of the quality of life--requires that the attempt to trade off applied for basic research or vice versa be abandoned, and that support for basic research of all kinds be increased significantly.

In looking toward the new research projects that might specifically emerge from the issues surrounding equilibrium, three specific areas of study come to mind: (a) zero-population growth systems, (b) no-growth economic systems, and (c) low throughput material resource production systems. While these three areas are of obvious relevance to the process of transformation to equilibrium, they are currently receiving relatively little attention from major funding sources. While rather large sums of money are beginning to flow into areas of physical systems research, around such growth-related issues as energy, pollution and material resource conservation, the social systems issues that underlie and/or co-determine the physical systems problems have been subjected to benign neglect. This neglect must cease to exist among government agencies, private foundations, and researchers themselves.

## Need #2: New Approaches to Technological Research

While a relatively large amount of money has been directed toward solution of complex, physical-systems problems through the development of increasingly sophisticated, but costly "hard" technologies, very little money is being given to "soft" technological research projects that are consistent with equilibrium, i.e., that provide answers to complex, physical systems problems without increasing the consumption of energy or nonrenewable resources and without generating social and ecological costs that outweigh their benefits. These projects involve investigation of efficient uses of currently available resources (e.g. studies of new mass transit systems) and the development of new means of tapping renewable resources (e.g. solar energy, tidal actions, wind, temperature changes). These new technologies also involve a more complete understanding of the "positive" influence which various natural disasters (e.g. forest fires and predation) may have on establishing or re-establishing ecological balance in various biological systems.

More specifically, we detect a number of critical needs that are not currently being met in applied research:

a. Intermediate Technology. There is a great need for more research and development of what Schumacher calls 'intermediate' kinds of technology.[74] This is essential to reducing the environmental impact of technology in the over-developed countries (ODC's) and to improving the quality of life in the less developed countries (LDC's) at minimal environmental, social, and resource cost.

b. Energy. Currently there is far too much support being given to the development of nuclear fission/fast breeder reactors and far too little to research and development of other energy alternatives. In our view, nuclear fission power plants pose such an enormous ecological and social threat that not only should their further development be abandoned, but their very existence should be outlawed. There is a critical need for far greater research and development of solar energy, possible fusion energy, and energy conservation techniques.

c. Materials. We need to know far more about how to substitute renewable for nonrenewable resources. A great deal of R & D is needed on techniques for efficient and effective recycling.

d. Communications. Peter Goldmark[75] is doing important research on the use of cable TV (actually Broadband Cable Networks or BCN's) to facilitate decentralization of human settlements. Goldmark's research underscores the magnitude of our ignorance about the "environmental impact" of communications/education technology. (It is significant in this regard that, to the best of our knowledge, the FCC has never filed an environmental impact statement with the Council on Environmental Quality.) Vastly more research in this critical area is needed.

e. Modelling and Other Policy Tools. Computer models and simulations are tools for policy research that have come into widespread use only in relatively recent years. Outside of the military and the space program, most of the models and simulations that have been employed have not proven extremely useful. Forrester's system dynamics methodology offers a powerful new tool for policy-makers that deserves further development. Other, more powerful tools for policy analysts and managers need to be developed to enable these people to deal more effectively with the problems of extremely complex systems.

## Need #3: Emphasis on Holistic Research

The emphasis in the current research response to the various problems which comprise a general, ecological crisis is far too heavily skewed toward the technological and physical. The "sputnik response" has been dominant. For example, in response to the "energy crisis," almost all of the new support from government and industry for energy research has focused on the development of new resources of mineral fuels and the development of new power-generating technology. Virtually no support has been given to the equally if not more crucial research on social, psychological, economic and political aspects of the problem of energy use and distribution.

The emphasis in future research efforts related to the problems of growth and equilibrium must be shifted away from the technological and physical and towards a more balanced consideration of the human and total systemic factors. In particular, there is a great need for more study of the inter-relations between social, psychological, economic and political factors, and technical, structural, environmental and physical factors. For example, we know little about the likely social, psychological, and political aspects of an economy based totally on solar energy technology, except that they would almost certainly be radically different from those of our existing industrial society.

The holistic approach to physical and social systems problems must also be embraced by those individuals who are engaged in research in the arts and humanities. Such an approach will define new relationships between form and function, and will be responsive to the new demands being placed upon the aesthetic dimensions of society by the transformation to equilibrium. More specifically, as greater emphasis is placed on growth in noneconomic areas, then new support will emerge for expression in various artistic media, leading to a greater emphasis on form, both in terms of craftsmanship (ability to skillfully produce forms) and creativity (ability to develop new forms). Simultaneously, there will be a new emphasis on function, as various kinds of physical systems are modified to become more efficient.

On the one hand, function will follow form: a product will be valued for its aesthetic as well as economic value; on the other hand, form will follow function: a product will be valued if it is produced efficiently, and a production process will be valued if the form in which the process takes place clearly reflects and supports the function for which the process was intended. Form and function in the equilibrium society thereby become intricately interdependent and inter-related.

Need #4: Social-Systems Transformation Research

More research should be conducted not only on the consequences of growth and equilibrium on social systems, but also on the means of bringing about the transformation from growth to equilibrium in social systems. This research task will be particularly challenging, for we possess only rudimentary models of social transformation or change in small social systems (small groups and organizations) and even fewer viable models of social transformation in large social systems (nations, international organizations).

With reference to small social systems, we feel that specific theories or models need to be tested with specific regard to whether or not these models are:

setting-specific (the approach is successful in one setting, but it may not also be successful in other similar settings; i.e., the problem of N=1 research);

consultant-specific (The approach works with one or several consultants--usually the individual who developed the theory or model--but it may not work with other consultants; i.e., the problem of theories that emerge from the experiences of one or a few individuals);

systems-characteristics-specific (the approach may be generalizable to certain kinds of settings and/or to certain kinds of consultants; there may be specific characteristics that are shared by these settings and/or consultants that are particularly compatible with the approach).

Put in another light, one of the primary problems encountered in the field of planning change is that adequate attention (money, people, time) is rarely devoted to the evaluation of change efforts (whether planned or unplanned). While evaluation of social systems is extremely difficult, often biased, and sometimes even counter-productive (a little knowledge often being more harmful than no knowledge), it is essential that systems transformations be evaluated in order to minimize the "reinvention of the social systems wheel." Furthermore, only if we gain more experience at doing evaluations in real, complex systems can we hope to improve on the current evaluation procedures.

In planning for social transformation on a global scale it becomes essential to consider the major differences and inequalities among world cultures and societies. It is now clear that, given population, environmental and resource constraints, the poor nations of the Third World will never attain the current level of industrialization of the overdeveloped countries of the West. If future improvements in quality of life are to be attained in these countries, it will be necessary to "leap-frog" from a pre-industrial to a post-industrial society.

Since most conventional efforts at "development" in these countries have been directed at the impossible and undesirable goal of Western/American industrial affluence there is little experience or knowledge to indicate how this leap-frogging can best be done.

The problem now appears to have two parts. Many third world countries that are endowed with the vital material or energy resources needed by the over-developed countries may follow the OPEC model and achieve an intermediate redistribution of wealth through nationalization and the formation of cartels. However, as the oil-producing states have now discovered, planning for the post-depletion era of economies based heavily on a single, nonrenewable resource will prove an extremely thorny problem. For those less developed countries that are not endowed with exportable reserves of critical resources (now coming to be called the Fourth World) the problem of creating an equilibrium society without the boost of intermediate affluence may prove even more difficult, and perhaps even insurmountable without major outside assistance.

While to some extent the transformation to an equilibrium society might seem easier for many LDC's than the ODC's (many traditional cultures being fairly well attuned to the needs of equilibrium) the high vulnerability of the populations of these countries to the predations of famine, epidemics, and other disasters (e.g., Bangladesh, the Sahel, etc.) makes the tolerable margin of error in planning for leap-frogging comparatively smaller than that for the transformation of industrial societies. What is clear is that the problems of transformation to equilibrium are both quantitatively and qualitatively different for the ODC's and the LDC's and that an equal or even greater research effort is required to solve these problems for the LDC's as is required for the ODC's.

### Need#5: New Training Programs for Researchers

The research needs that have just been described necessitates not only a change in priorities and research methodology, but also an accompanying change in programs for training researchers. Because many of the kinds of research just described are unconventional, and even in some cases unprecedented, there is an urgent need to train inter-disciplinary, problem-centered researchers who can respond effectively to these needs.

## B. Curriculum Needs

It is a central thesis of this paper that the limits to growth and the needed transformation to some kind of an equilibrium society imply major changes in the postsecondary education curriculum. Here we will discuss some of the changes which seem most important to us.

1. Lifelong Education. Many educators have called for a change from our current predominantly child- and adolescent-centered education system to a system of "lifelong" or "continuing" education.[76] Shane has argued persuasively for the promulgation of such a model, strongly basing his case on considerations having to do with limits to growth. Many[77] of the oracles of a "post-industrial" society also foresee the establishment of such a model. We feel that some kind of lifelong model of education is essential to the transformation to, and maintenance of, an equilibrium society. In the short term, our rationale is that the current adult and adolescent populations must play a leading role in the transformation to equilibrium. In the longer term, we foresee that education will be a central--if not the central--activity in any kind of an equilibrium society that will engage a major part of the time and energies of people of all ages.

2. Interdisciplinary Discipline. It has become almost a cliche observation that virtually no real-world problem of any significance can be analyzed or solved within the bounds of any one of the established academic disciplines. It is implicit in everything written above that the problems of growth and equilibrium require interdisciplinary approaches in research and teaching. Indeed,recognition of the need for interdisciplinary studies has been so widespread that many i/d courses and programs have appeared on campuses in the U.S. and elsewhere in recent years.

Unfortunately, most i/d programs that have emerged on (and off) campuses to date have, by being "interdisciplinary", sacrificed the intellectual "discipline" which effective higher education requires. Most of these programs have taken a "smorgasbord" approach to i/d programs, presenting the student with a variety of offerings from established disciplines, organized around a general theme, like "environmental studies", or "futuristics", but generally lacking a coherent intellectual integrity. From the student's point of view, such programs have often been inefficient and largely ineffective. A crucial need, therefore, in the curricular responses to the problems of growth and equilibrium is the development of an interdisciplinary discipline. While much work and experimentaion remain to be done in this regard, we have several ideas wbout what the needs of disciplined i/d studies are.

First, and most generally, there is a need for instructional materials, methods, and learning environments that are uniquely designed for i/d study and learning.

Second, there is a need for further development and dissemination of Forrester's system dynamics methodology both as an instructional andproblem-solving tool. System dynamics is now one of our most powerful, uniquely interdisciplinary methodologies. While not every "transformer" need be expert in system dynamics, we feel that at least a basic understanding of the principles and techniques of system dynamics is essential for real-world problem-solving. Better instructional materials and more well-trained practitioners are needed to make this methodology more widely available.

Third, the WORLD 3 model (which formed the basis for The Limits To Growth) and other dynamic models of real-world systems that concern problem-solvers need to be developed into useful instructional materials. Most of these models are designed as tools for policy analysis and are not well tailored to the needs of effective instruction. It might be useful, for example, to restructure the WORLD3 model so that it could be used as a game by several students at once, rather than simply as a simulation to be run by each student working individually. Supplementary texts, programming language guides, readings, tests, and teacher guides need to be developed to make the use of such models in instruction more effective.

Fourth, an essential part of any interdisciplinary program should be problem-centered courses and field work. Theoretical solutions to real-world problems often are irrelevant or unimplementable. Students can become competent real-world problem-solvers only by spending a major portion of their time actually analyzing and solving real problems. This necessarily involves to a significant extent getting out of the academy and "into the field". The Public Interest Research Groups (PIRGs) which Ralph Nader has inspired on many campuses are an excellent model for this kind of activity. What is lacking in most cases is the integration of this kind of problem-centered/field study into a coherent i/d curriculum. Also, we think that the value of this kind of study can be improved if each student has the opportunity to work in a variety of different social, cultural and environmental settings, rather than just in the immediate vicinity of his own school. Student-exchange programs, internships, and sabbatical periods could help to facilitate such diversity.

Fifth, allied with the need for problem-centered studies is the need for group study and research. A conventional "class" is not necessarily a functionally integrated group. In fact it rarely is. Group learning is the exception rather than the rule. We believe it is essential to successful i/d programs to provide group learning experiences, since effective transformers will almost always have to work collaboratively with others, and therefore will need the interpersonal and other skills required to make group enterprises productive. Study groups should have maximum autonomy in defining and planning projects and in defining the criteria of evaluation of success or failure of the projects. The role of the teacher should be that of group co-member, action guide, resource referral agent, and learning facilitator. Since effective evaluation cannot be done by a member of the group or the group itself, the teacher ought not evaluate the outcome of the project. Evaluation ought to be done by an independent agent chosen collaboratively by the group.

Sixth, some parts of the total curriculum should be "required." It has become vogue throughout much of our contemporary educational system to do away with "requirements" altogether, to leave students totally free to "do their own thing." This trend seems to be based in part on an erroneous presumption that people can anticipate the value of knowledge or experience which they have not yet acquired. We think that effective i/d studies should have some "requirements." In fact, we believe that there should be a required "core" curriculum that should be central to all disciplinary and professional training in higher education. The essential "requirement" here should not be for the student to learn a particular set of "things", but rather to confront a critical set of issues, problems, and experiences. It should be clearly understood that what we are proposing here is not to sell a particular position on the issues surrounding limits to growth, or particular solutions to the problems of growth. What we propose is simply an educational process which will compel our students to at least confront those issues and problems, and which will hopefully provide them with tools and skills that will be useful in creating their own positions on those issues and in seeking their own solutions to those problems.

Seventh, effective i/d training for competent transformers must include a major experiential compenent. We are especially concerned with providing learning experiences that can facilitate the growth of inter-personal and intrapersonal competencies. Some of the techniques currently in use by Outward Bound, Arica, Esalen, EST, etc. should be adopted, evaluated, and improved upon.

Eighth, it must be recognized that just as effective psychotherapy must be responsive to the needs of different kinds of patients, so too must effective i/d training be responsive to the needs of different kinds of students. Teachers with i/d experience tell us that they find at least three different kinds of students in their classes. The first kind of student is highly motivated to attack real-world problems and look for solutions. The second kind sees the overwhelming complexity and inertia of the whole social/ ecological system and, feeling impotent to influence it, becomes depressed. This kind of student is liable to psychologically , if not actually, "drop out." The third kind of student is essentially just putting in his time in the educational system as a stepping-stone to a career that he anticipates will provide him with social and financial security. He is willfully ignorant of the critical problems and issues of the day, or assumes that "they" will solve them. These, and other, different kinds of students need i/d programs which are responsive to their unique social and psychological as well as intellectual, needs.

Ninth, in line with some of what has been mentioned above, we need a new generation of teachers in postsecondary education who are well-trained and highly competent in the skills required to be an effective learning facilitator.

Tenth, as a complement to group learning, there is a need for modularization and individuation of instruction, particularly in disciplines or other areas where there are knowledge bases or skill sets that are useful or essential to i/d problem-solving. For example, members of a group studying land use problems in their local community may need supplementary training in statistics, demography, geology, law, etc. The currently typical structure of postsecondary education, almost totally organized on the basis of semester-trimester-, or quarter-long "courses" will serve the needs of these students badly, if at all. What are needed are shorter instructional modules, e.g., from one to four weeks in length, and/or programmed self-instructional materials that can fill the i/d student's needs for concise but coherent packages of knowledge.

An eleventh and final requisite for effective i/d programs must be a significant creativity component. We are thinking here of training in manual skills, arts, crafts, etc. It may be an open question whether it is possible to actually "teach" creativity, but certainly educational processes can do a great deal to facilitate the growth of creativity and the full realization of each individual's creative potential. As suggested to us by Bateson above, creativity is one of the most essential competencies that an effective transformer must have; we must do all that we can to cultivate it.

3. New Roles for Disciplines and Professions. Some may feel that the thrust toward greater interdisciplinarity in postsecondary education means the eventual abolition of established disciplines and professions. We see most established disciplines and professions continuing to play an important role in the postsecondary education of the future, but with the now rather rigid boundaries between disciplinary and professional "turf" becoming vastly more flexible and permeable to the interests and activities of faculty and students alike.

On the one hand, many aspects of traditional disciplinary studies may take on new meaning and relevance in the context of problem-centered, i/d studies. For example, as novice transformers learn the importance of reality images and value structures in the effective solution of real-world problems, their appreciation of, and thirst for, the wisdom to be offered by the arts, literature, philosophy, etc. may be heightened to a level undreamed of in the traditional liberal arts college. On the other hand, the needs of a more i/d educational system will no doubt lead to significant qualitative changes in the nature of many disciplinary and professional studies. For example, the study of history may place greater emphasis on the role of the historian in providing more "instant history", or short-term feedback on major social/ecological trends, as well as adapting more to a concept of "alternative histories" analogous to the concept of "alternative futures." The study of history itself may come to be seen more as an exercise in the process of metaphor-generation than fact-determination.

4. Credentials. In the new institutional paradigm we sketched out above, we called for a greater emphasis in credentialing and employment to be placed on functional competency and less on status. In the short term, however, this paradigm is not yet dominant and it would be naive to disregard the relation of academic credentials to employment in conventional institutions. Many existing i/d, problem-centered programs provide their students with educational experiences which are patently "relevant", but do not necessarily provide them with credentials which permit them--and the heightened consciousness and skill they have acquired--to be introduced into the established institutions which govern our society. One of the major challenges in introducing major innovations in postsecondary education is not only to create a generation of competent transformers, but to see that they are actually employed.

5. Military and Law Enforcement Integration. In recent years there has been a trend, sparked by the anti-war and other protest movements of the 60's, to isolate military and law enforcement training from the mainstream of postsecondary education. In line with some of our thoughts presented earlier about the role of military and law enforcement institutions in an equilibrium society, we think that this is an undesirable trend that ought to be reversed. In fact, we think that a major effort should be made to integrate the education of military and law enforcement personnel as thoroughly as possible into the mainstream of the kind of interdisciplinary, problem-centered postsecondary education that we have been describing in this section.

6. Engagement-Affirmative Action. Much of what we have suggested to this point for curriculum innovation no doubt smacks of a certain elitism. The fact is that revolutions always are led by elites against the elites of the establishments. We do not think that leadership by an elite is necessarily undesirable as long as initiation to the elite is based on competency rather than social class or economic status. There is little doubt that much of the response to date to the problems of growth and equilibrium has been led by predominantly white, male, middle-class people. "Affirmative action" is urgently needed to broaden the spectrum of participation in the process of transformation to an equilibrium society; to engage a representative proportion

of women, minorities, third world people, blue collar workers, poor people and other currently under-represented groups in the leadership of transformation. Among other things, this means the creation of some postsecondary educational programs explicitly designed to engage these currently under-represented populations in the transformation process.

7. Life Planning and Management. Another postsecondary curriculum need which is somewhat different from those mentioned above is in the area of personal life planning and management. That is, in the general framework of new growth alternatives, individual people will have to learn new ways of living their everyday life. Growth alternatives have implications for different kinds of work, consumption patterns, eating habits, family and community relations, child-having and child-rearing practices, entertainment, education etc. Critical needs in this area are for equilibrium-oriented consumer education and parent education (regardless of whether "parents" are members of a nuclear family, or members of alternative social units taking responsibility for child-rearing.)

8. Leap-frogging. As indicated in the previous discussion of research needs, the requirements of the LDC's in making the transformation to equilibrium are both quantitatively and qualitatively different from these of the ODC's. Not only is there a crucial need for research on how the LDC's can effectively and efficiently leap-frog from a pre- to a post- industrial society, but there is an equally urgent need

for educational programs in these countries that can help them develop the kinds of human capital that can guide and facilitate this different kind of transformation. That is, we must develop programs for training competent transformers who are specially responsive to the needs of third world societies. This need is only exacerbated by the fact that many of these countries inherited "schooling" systems from their colonial masters which are of dubious value in their native societies, and which are grossly inadequate or inappropriate for the cultures upon which they were forced. The trend towards "naturalization" of the educational systems--paralleling "naturalization" of the social, economic, and political systems--in many LDC's has already begun, but needs to be accelerated if these countries are to be successful in developing their own unique approaches to an equilibrium society.

9. Pilot programs. Virtually all of the suggestions made above for curriculum innovation in postsecondary education are predominantly untested. There is a need for experimentation and refinement in all of the areas that have been mentioned, as well as others that we have not yet anticipated. There is a crucial need for pilot programs to begin as soon as possible in education for transformation so that we can develop the "state of the art" as rapidly as possible; so that we can begin to learn how to learn.

## C. Education Institutional Needs

The transformation to an equilibrium society, by itself, implies changes in the nature of educational institutions, just as it implies changes in the nature of all of the other kinds of institutions that make up the fabric of society. As indicated in our earlier discussion of institutional transformation, however, the transformation that must occur in the institutional infrastructure of the society as a whole must be anticipated in the educational sector. This is because we view the educational system as having an essential prerequisite and continuing role in fomenting transformation in the larger social/ecological system.

Beyond this general imperative, it is clear that satisfying the research and curriculum needs we have suggested above would require not only significant changes in existing institutions of postsecondary educations, but even in some cases the creations of whole new kinds of educational institutions. In this section, we will describe some of the changes and innovations that seem to be implied for educational institutions by all that precedes it.

1. New Education Institutional Paradigm. In Table II we outlined the general institutional paradigm shift which we believe is implied by the transformation to an equilibrium society. Everything that was said in that table about the new paradigm for institutions in general applies as well to

educational institutions in particular. The reader may want to review that table at this point and consider how the changes suggested there would be manifested specifically in the educational sector.

Besides this general institutional paradigm shift, there are also some changes implied by the discussion in the preceding sections that are uniquely relevant to educational institutions. These changes are mainly at the levels of goals, and of technology/technique. They are summarized in Table V.

### 2. New Kinds of Institutions of Postsecondary Education

The above implies substantial change in the institutions of postsecondary education. This is not to say that great public universitites, small private liberal arts colleges, community colleges or other kinds of conventional institutions of postsecondary education need or will cease to exist. But it does suggest a major qualitative change in the nature of these institutions, and of postsecondary education as a whole. The overall need is for a system of postsecondary education which is far more interdisciplinary and problem-centered; which is far more attuned to the pressing needs of its social/ecological environment; and hence which is far more actively and consciously engaged in the process of transformation to an equilibrium society. This implies not only major adaptations of existing educational institutions, but

TABLE V

## Educational Institutions

## Paradigm Shift

### GOALS

| OLD | NEW |
|---|---|
| 1. Conservative | 1. Transformational |

The goals of the old educational institution tend to be conservative in the sense that they are oriented toward the past and to maintenance. By contrast, the goals of the new educational institution are far more future-focused, and are far more concerned with the adaptive transformation of society.

| OLD | NEW |
|---|---|
| 2. Relatively fixed model of the "educated person"; anthropocentric | 2. Evolving model of the "educated person"; holistic |

To the extent that educational institutions are "product-oriented"--that is, concerned with the production of "educated persons"--the old model of the "educated person " tends to be fairly rigid, based on values which are largely anthropocentric. The new model of the "educated person" is more flexible, evolving through time to meet the needs of transformation; and is based on values which are more holistic in the sense of responding to not only social, but ecological, ideals.

| OLD | NEW |
|---|---|
| 3. Passive response to consumer demand | 3. Interactive, collaborative response to consumer demand. |

To the extent that educational institutions are "consumer-oriented"--that is, concerned with providing educational services to meet the demands of students-as-consumers--the old model tends to respond to these demands in a passive way, operating on the implicit assumption that the student's demands are informed, non-arbitrary, rational, and of social/ecological value. The new model questions these assumptions, and attempts to synthesize both the product- and consumer- orientations by working interactively, collaboratively with students to formulate educational programs that are responsive to the needs of both the student, the institution, and also of the larger social/ecological system.

| | |
|---|---|
| 4. The system focuses on Learning I | 4. The system focuses on Learning II and III also. |

That is, the old system is almost exclusively concerned with learning as information-processing. The new system is additionally concerned with learning-to-learn and with the expansion of consciousness.

| | |
|---|---|
| 5. Research, teaching separate, often conflicting | 5. Research, teaching in more complex integration. |

In many contemporary higher education institutions, there is generally little harmony or integration between research and teaching. At some schools, teaching is sacrificed for the sake of research; at others just the opposite is true. In the new paradigm, research and teaching become more harmonious, mutually supportive activities.

## TECHNOLOGY/TECHNIQUE

| | |
|---|---|
| 1. One-way ("empty-head" model) | 1. Interactive, facilitative, cyclical |

In most of contemporary education, the dominant model of learning is a one-way model, where knowledge is seen as flowing one way from an informed instructor to an uninformed student (the "empty head"). In the new model, learning is viewed as an interactive, cyclical process of trial and error, of giving and receiving feedback. The teacher's role is far more that of facilitator than of pundit.

| | |
|---|---|
| 2. Authority-based | 2. Experience-based |

Again, in the old, learning flows from sources of authority; in the new, learning flows from experience.

3. Error-avoiding

3. Error-embracing

The old discourages trials and punished errors. The new facilitates and encourages the process of trial and error.

4. Negative Reinforcement

4. Positive Reinforcement

The old methodology shapes behavior through the withholding of rewards or through punishment. The new shapes behavior through positive incentive structures.

5. Imposed timing/pacing

5. Self-timing/pacing

In the old instructional methodology, the schedule or pace of learning is imposed by the institution and faculty. In the new, the student is far more in charge of determining the pace of his own learning.

6. Competitive.

6. Cooperative

The ethos of the old is almost totally competitive, social-darwinist. The ethos of the new is cooperative, symbiotic.

7. Isolated learning

7. Group learning

Consistent with 6, in the new, group learning complements individual learning.

8. Comparative (competitive) evaluation

8. Criterion-referenced (performance-based) evaluation

In the old system, evaluation is symbolized by "the curve". The individual's performance is evaluated in comparison with that of his peers. In the new system, evaluation is referenced to performance criteria.

9. Imposed goal-setting and evaluation

9. Participatory goal-setting and evaluation

In the old, goals are set by authority, and students; performances are evaluated by authority. In the new, students participate in the establishment of learning goals and in choosing the criteria and methods of evaluation.

also, in many cases, the creation of whole new kinds of educational institutions.

We cannot describe all of the different new kinds of educational institutions that are possible and are needed, except to say that, in general, they would emphasize the concept of an educational institution as an experimental/experiential setting. In the transformation to equilibrium, the most critical need now is for settings in which growth alternatives can be both "tried out" and "tried on." That is, there is a need for settings where alternatives to existing growth-based systems are not only developed in theory, but also where these alternatives can be experimented with and developed in practice, and where real human beings can actually experience them to see how they "fit." As E. F. Schumacher put it in a recent conversation, the need is to make viable alternatives visible. And it should be emphasized that when we speak of growth alternatives we mean not only economic or technological alternatives, but also political alternatives, social alternatives, cultural alternatives, alternative values and alternative realities. The salient characteristic of the kinds of new experimental/experiential settings we are talking about is that they create, provide, and evolve comprehensive social/ecological alternatives.

The need for these new kinds of educational institutions could be met in any number of ways. In some cases they might emerge as autonomous institutions. In other cases, they might develop as off-shoots, or as "alternative campuses", of conventional kinds of higher education institutions. These "alternative campuses" would serve as sorts of "community systems laboratories" where students, teachers, scholars, managers, public officials and other citizens would come together for the purpose of experimenting with and experiencing alternative kinds of communities that could satisfy human needs and aspirations while remaining viable organisms within the constraints of the global ecosystem. In fact, in many cases, the "campus" would not be localized but would be comprised of a decentralized network of settings and experiences.

3. New Recognition of Educational Roles/Functions of Other Institutions. Closely associated with the need for new kinds of educational institutions is the need for greater recognition of the important educational roles and functions of other institutions which do not primarily think of themselves as educational. The educational role of the mass media--television, radio, newspapers and periodicals--is pretty widely recognized; but there is actually relatively little effort made to maximize the educational effectiveness of these media. The educational functions and responsibilities of other social institutions--labor unions, business firms, public interest groups, charitable and service organizations, the military, government agencies, etc.--are only now starting

to be realized. The fact is that these latter kinds of institutions can be expected to play an increasingly important role in postsecondary education in the future, a trend that will be matched by a decline in the relative importance of conventional colleges and universities.

The participation of these other institutions in postsecondary education will be critical to the development of the new kinds of educational institutions discussed above; the requisite diversity of settings and experiences can only be achieved with the active engagement of these other social institutions. Conversely, the growing importance of the educational roles of institutions that are not primarily educational implies a need for more conscious and rigorous planning and management of the educational functions of these institutions. In general, we envisage both the need and the likelihood for a blurring of the boundaries between educational and non-educational institutions.

4. New Directions in Educational Management. In recent years, as the amount of money spent and the number of people engaged in education has grown, there has been increasing interest in improving the management of educational institutions in order to increase both the efficiency and effectiveness of educational enterprises. For example, in the field of higher educations, the National Center for Higher Education Management Systems (NCHEMS) has been working to develop the

skills and technology required to improve the management of colleges and universities. However, the problems discussed in this paper, and the particular educational innovations described in this and the previous two sections, imply a need for some new directions in educational management.

First of all, there is the now generally-recognized fact that higher education, in the U.S. at least, has now reached its own "limits to growth." With the passing of the "baby boom" generation into adulthood, enrollments in colleges and universities in the next several years can be expected to level off and even to decline. For private institutions, a depressed economy has reduced income from endowments, discouraged contributions, and dried up the flow of foundation grants, all reducing income while inflation has made costs skyrocket. Public institutions are only slightly better off, as tax-payers and legislators have become more budget-conscious while inflation continues to take its toll.

The short-term response to these conditions has included cost-cutting, retrenchment, and more active--sometimes cutthroat --competition among institutions to attract increasingly scarce dollars and students. These conditions do not represent a transient perturbation, however, but rather represent a secular trend which--even independently of the various needs for change suggested above--will dictate major changes in the character of higher education institutions in the U. S.

There is currently little knowledge or expertise to guide the management of colleges and universities in this unprecedented situation, with the result that many institutions are now foundering. The danger in this situation is not so much that some institutions will perish--since that is an inevitable and not necessarily undesirable consequence of an excessive capacity in a declining market--as much as it is that there may be a significant reduction in institutional *diversity* with deleterious consequences for the quality of postsecondary education as a whole.

A second major new direction for the development of educational management is suggested by the needs for unorthodox educational settings and the growing educational function of non-educational institutions. The creation of these new settings and new educational roles will lead to educational management problems to which conventional know-how will be almost totally inapplicable.

*5. New Educational Inter-Institutions.* All of the needs for innovation in educational institutions described above imply, in turn, the need for new structures for inter-institutional cooperation in postsecondary education. In a system which has already attained its own "limits to growth", debilitating competition and unnecessary duplication of effort become intolerable. Furthermore, many of the research, curriculum and institutional needs that we have observed above can be met in no other way than through inter-institutional cooperation. This suggests that if these needs are to be satisfied, the role of educational intersects and consortia will be critical. Where these kinds of inter-institutions already exist, we see their role needing to be strengthened; where they do not exist, we see the need for their creation. The development of interdisciplinary research and curricula, student and faculty exchange, and "alternative campuses" are just a few areas where the contribution of educational inter-institutions would be crucial.

6. New Educational Meta-Institutions. What seems to us to be perhaps the most critical institutional need for the process of transformation to occur is for the creation and development of educational meta-institutions, based at least partly on Schon's network concept,[78] and explicitly devoted to the facilitation of the kinds of educational changes and innovations described above. There is, to the best of our knowledge, currently in existence, no organized setting which is (a) dedicated to the transformation to an equilibrium society, and (b) capable of providing or facilitating the kinds of research, experimentation, communication, consultation, and cooperation that would be required for the transformation of educational and other institutions. Without the catalytic assistance of such meta-institutions, the process of transformation in education institutions

and by extension in other social institutions-- will be slow in coming, erratic, and far more crisis-laden than it need be. The essential purpose of the kind of meta-institution we envisage would be to further develop the kind of theory of which this paper is only a preliminary and feeble example far more exhaustively, precisely, and effectively; and then, to put that theory into practice, through consultation, training, networking, etc.

## CHAPTER FOUR: RECOMMENDATIONS FOR INNOVATION AND CHANGE

Throughout this paper we have sought to clarify our own assumptions concerning equilibrium, and concerning the institutions, roles and skills that would enable the transformation to equilibrium to take place. We then considered the implications of these assumptions for postsecondary education, focusing on research, curriculum and institutional needs. In the next two chapters, we wish to translate these concepts into recommendations for change and suggested strategies for achieving change. These recommendations and strategies will include both program designs and action steps for specific constituencies. The goal of these recommendations and strategies is to enable postsecondary educational institutions to begin to respond to the problems of growth and equilibrium.

We shall begin with a series of recommendations for the collegiate sector of postsecondary education. This sector, according to the categorization of the National Commission for the Financing of Postsecondary Education, includes all two- and four-year, private and public colleges and universities. We will subsequently consider the noncollegiate sector, consisting of all other institutions that offer educational programs beyond the secondary school level; including libraries, museums, recreational programs, propriety schools, vocational and professional inhouse training programs, etc.

## I. The Collegiate Sector

We will offer several specific recommendations to provide initial direction for the complex and extended process of transformation that is needed in traditional colleges and universities if they are to serve a vital role in moving our society toward equilibrium. We will first focus on intra-institutional recommendations, then provide inter-institutional and meta-institutional recommendations. In the next chapter, we will consider these recommendations for change, and suggest a number of strategies that might be used by specific constituencies to implement these recommendations.

A. Intra-Institutional Recommendations. Our first and most central recommendation concerns the current curriculum in most collegiate institutions. The curriculum of these institutions should reflect an understanding and acceptance of the new kinds of institutions, roles and skills outlined earlier, and should generally help lead society toward a state of equilibrium. In order for a collegiate institution to embrace the broad curricular changes implied by this statement, it would be necessary for it to abandon the primary assumption that curriculum is guided and even justified by past practice and precedent.

Members of institutional curriculum committees must adopt a set of "future-responsive" premises based on a long-term perspective that accurately reflects future rather than past needs of both students and their society. Such changes in the process of curriculum development necessitate disciplinary reorganization in most institutions, new concepts of core curricula, and professional development and training.

Recommendation #1: Disciplinary Reorganization: Significant structural changes in academic departments will have to accompany curricular changes, for traditional disciplinary organizations do not provide the flexibility needed to generate and convey new information contained in the "cracks" between disciplines or "bridges" over disciplines. The traditional disciplines occupy too much of the energy and attention of most educators and students who might profitably explore either other disciplines or the problems within their own disciplines from alternative perspectives.

The reorganization of disciplines would also help to reshape professional loyalties. Quite clearly, in recent years, with an emphasis on research, many college faculty have attached primary loyality to their disciplinary department, reflecting their primary concern for disciplinary research. A reorganization of discipline-oriented departmental structures would provoke the faculty member to reassess his or her loyalty to the mission(s) of the institution (which usually includes teaching and service to society as well as research), and to the profession of teaching.

Following are three specific reorganization schemes that American colleges and universities might embrace:

a. Intersect Departments. The institution retains its traditional disciplines as home bases for each faculty member (consuming 1/4 to 1/2 of his or her time). However, each (or most) faculty would also be associated with one or more other inter-, multi- or meta-discipline or specific problem-oriented (e.g., Urban Redevelopment) departments, that have their own budgets, chairpersons and governance systems. These "intersect" departments would be designed, in most instances, for a limited life span (2-5 years), thus enabling a faculty member to tackle several different perspectives and problems in his or her professional lifetime. Students would be able to get degrees through their intersect departments. "Specialists" in these intersects would be hired for the life span of the department, or for a shorter period of time to get the department started . The institutions might also hire one or two "interest" managers or consultants who could facilitate rapid organization and team-building among the members of the short-lived "intersect" departments.

b. Divisional Reorganization. The institution abandons its traditional disciplines and moves instead to a divisional situation that incorporates several disciplines; for example, behavioral science division might incorporate psychology, sociology, political science and anthropology. This divisional structure would probably provide some sub-system governance structures reflecting old disciplinary boundaries. The primary decision-making function, however, would be incorporated at the division level. The divisions should be periodically re-examined to determine if they continue to be maximally appropriate, given changing curricular needs and interdisciplinary trends. As in the case of the intersect departments, an institution should make use of facilitators or managers to make the "merger" an effective and creative process.

c. Course-level Reorganizations Probably the least profound reorganization scheme is to provide new course structures that encourage a breaking down of traditional disciplinary boundaries. Specific courses of an inter-, multi- and meta-disciplinary nature are emphasized, necessitating either that several faculty members from two or more disciplines team-teach the course, that the teacher of the course consult with faculty from other disciplines on the design and content of the course, or that new faculty members be hired with specific expertise in the inter-, multi- or meta-disciplinary course.

The course-level reorganization can also take place by identifying specific courses that all or most students must take and in which all or most faculty must be engaged. This course might range from a comprehensive history of civilization, a two- to three-year sequence, to a specific problem-oriented course on alienations or human conflict. With all of the students and faculty of an institution being involved in a single task and dealing with a specific topic, an institution can maximize the impact of the topic on both students and faculty, especially if all members of the institution share in a common experience associated with the topic (field trip, simulation, retreat, etc.).

Recommendation #2: Development of a New Core Curriculum. The concept of a"liberal arts" education that prevailed in private higher education until the 1960's incorporated the notion of a basic core content (conveying attitudes as well as specific skills and knowledge) which prepared the college graduate for national or world "citizenship." Under the attack of "relevance," "freedom to choose course of study" and "efficiency," this traditional liberal arts core program fell out of favor with most collegiate educators.

The concept of educating people toward an equilibrium society reintroduces the goal of "citizenship"--but in a new format, with a new core curriculum. Instead of training people in the traditional values associated with growth and industry (e.g., the concepts of free enterprise and entrepreneurships), the new curriculum prepares people for a new set of values that may increasingly estrange them from their parents and mentors rather than bringing them in line with the "traditions" as was the case with many liberal arts programs of the 1920's-1950's. The new curriculum, instead of stressing history, will stress an understanding of one's own personal values and the shifting paradigms of one's current intellectual and social cultures.

The new core curriculum should include training in such basic enabling skills as: (a) computing (programming), (b) literacy (verbal and nonverbal), (c) communication (paraphrase, description of fellings, etc.), (d) interpersonal competence (Argyris), (e) physiological feedback and control, (f) values clarification, (g) life and career planning, (h) learning how to learn (including learning in nontraditional settings and skills related to lifelong learning), (i) intra-personal development (including skills related to creativity, expansion of consciousness, self-management, tolerance of risk and ambiguity, etc.), (j) process observation, (k) social system evaluation (error-sensing), (l) system dynamics analysis, and (m) methods of creative problem solving (including brainstorming, delphi, synectics, etc.).

These skills would be conveyed through a self-paced, competency-based format, making extensive use of such educational methods and technologies as simulations, auto-tutorial devices, experience-based learning programs, structured personal-growth workshops and structured internship/field placements. The core curriculum would be based on an established set of performance criteria, and would be designed so that students would have frequent and immediate access to performance checks. Students would be able to alter the sequencing and length of specific training programs to meet their own level and style of intellectual and emotional development. Some training programs would not be offered until the student is preparing to leave the institution. These programs would be specifically designed to assist the student in making the transition to other institutions and in continuing his educational/learning process (lifelong learning).

Recommendation#3: Professional Development and Training. Most members of collegiate institutions have not been adequately trained for teaching traditional subject matter in their "home" discipline. They have usually received training in research methodologies while graduate students and have generally mastered the content of their own discipline. They have rarely, however, received any formal training in teaching, academic advising, curriculum planning or other pedagogical functions. Consequently, when demands are made on these faculty members to teach new courses, from new perspectives, they are understandably reluctant. Unable to cope confidently with the demands for satisfactory instructional performance in their home discipline, they are naturally reticent to transit to a new instructional discipline where their sense of competency may be even more challenged.

A crisis is inherent in the intransigence of traditional faculty members, especially when one considers the profound transformation that is inherent in the movement toward an equilibrium society. Faculty who will still be teaching twenty or thirty years from today must be capable of teaching new concepts, preparing people for new kinds of roles, using new skills, in new institutions.To achieve this, professional training and development is essential. Several different approaches are recommended:

a. Problem-Oriented Training. Specialized training programs should be developed to acquaint faculty members with the concept of equilibrium, with the causes and consequences of growth, etc. Furthermore, the faculty member should be provided with specific instructional methods (simulations, role playing, etc.) for introducing these concepts to their students. The faculty member should have access to new information as well well as new teaching resources. The apprehensions of the faculty concerning new ideas and new methods can hopefully be reduced by providing them with specialized training that has high face validity with reference to new areas of curriculum development. The specialized training program could also provide faculty members with experiences in sheltered or simulated settings that plunge them into a model equilibrium society. In such a setting, the faculty member could develop his own concepts about equilibrium, as well as explore personal attitudes and feelings associated with various aspects of living in an equilibrium state.

b. General professional development. While most faculty would benefit from problem-oriented training, this will have only short-term effects, for the areas of new information will be continually changing, as more sophisticated techniques for prediction and social engineering (toward equilibrium) are developed. Furthermore, new and improved instructional materials will be produced, thereby rendering the initial training obsolescent in a short period of time. One can either conduct repeated updating workshops, or design alternative training experiences that enable the faculty member to continue the updating process on his own and to expand his conceptual and pedagogical horizons. Making use of the Bateson categories, the specialized training program would provide Level I learning, whereas a professional development program would provide Level II (learning to learn), and, if particularly effective, even Level III learning.

The faculty member would be treated in a professional development program not only as instructor, but also as person and member of a complex educational institution. The faculty member would be asked to explore his or her own attitudes concerning teaching, philosophy and values concerning education, and goals and assumptions concerning professional life. Sessions would also involve training in the use of a variety of educational methods and technologies, all of which can be adopted by the faculty member to his own preferred style of teaching, to the learning styles of his students, and to the educational environment of his institution. The faculty member would thus be prepared to use a variety of different instructional procedures to convey new curricula. Finally, the professional development program would provide interpersonal and organizational skills training to the faculty member so that he can work effectively with students, administrators and members of the nonacademic community on continuing reform of curriculum, as well as on effective instructional, advising and planning programs.

c. Comprehensive institutional development. Though faculty can certainly benefit from either a specialized training program or more general professional development program, they rarely are able to either sustain personal changes that have occured or effect broader systemic changes in their home institution without the assistence of a more comprehensive institutional development program. Such a program is outlined below under Recommendation #6.

B. Inter-Institutional Recommendations.

Limited expertise is currently available in many of the curricular areas that have been described in previous sections of this paper. Given this limited expertise, it is essential that these resources be shared in some optimal manner. Several inter-institutional innovations can facilitate this sharing of resources.

Recommendation #4: Regional Internships. Students who are being trained to provide leadership in the transformation of our society must be provided with practical experiences in the "real world." Though most colleges and universities now offer some internships to their undergraduate as well as graduate and professional students, these internships are usually limited to the geographic region of the institution. Furthermore, the interns are usually given jobs with low levels of responsibility, and narrow perspectives with reference to problems which are actually broadly systemic in nature.

An alternative approach involves specialized internships that are selected on a regional basis. These regional internships would be offered to students throughout the region, selection of students being based on skills, potential influence, etc. rather than proximity to the internship site. Interns would be placed in a variety of private and public agencies: urban planning, community development, consumer protection, historical societies, family planning, legislative analysis, performing arts centers, etc.

The proposed regional internship program would differ from the current regional internships that are sponsored by regional compact agencies (WICHE, SREB, NEBHE) in that there would be more formal preparation of the interns in the proposed program. Student-interns would be expected to have demonstrated competency in basic core areas (see Recommendation #2) before being admitted to the program, and would receive additional training in certain advanced skills (e.g. system dynamics) and concepts (e.g. organizational development) that would enable them to be particularly effective in working within an agency. Furthermore, under the proposed plan, the internship placements would be specifically chosen to maximize the chances of the student experiencing influence on a complex system. The rather high admissions requirements for interns would make the program more attractive to desirable agencies as well as to students themselves. The proposed internships would last for three months to one year.

Other aspects of the proposed internship program would closely resemble the regional compact programs now being offered. The internship salaries would be paid in part by the sponsoring agency and in part by an external funding agency. Internship reports would be required of all participating students. These might be published not as separate documents (as is the case with the regional compact internships) but in abbreviated form as annual compilations of regional reports. In the compilation and distribution of the internship reports, new conceptual frameworks could be derived to account for common occurrences, thereby increasing our understanding of regional systems phenomena.

Recommendation #5: Instructional "Circuit Riders". In 19th and 20th century rural America, the problem of scarce, specialized human resources was often solved by the use of "circuit riders". Judges traveled the circuit, as did doctors, ministers, and entertainers. We propose a similar solution to the contemporary problem of limited expertise in certain instructional areas.

Individuals with specialized expertise in such areas as system dynamics, community development and organizational consultation should be hired on a regional basis by a consortium of collegiate and/or noncollegiate institutions. These specialists would conduct courses at several different locations in the region over a three month, six month or one year period. The locations would be chosen to provide maximum accessibility of all populations in the region to the specialized resource.

The "circuit" instruction would be enhanced in some instances by mobile instructional units (trucks and buses) that could carry laboratory equipment, demonstrations, simulations or small computers, or even serve as a classroom. While these mobile units would probably cost $30-100,000, and involve fairly high transportation costs, they provide significant savings of both money and material resources when compared to instructional units built at each circuit location.

Alternatively, of course, the television medium can be used to access remote locations (especially through the use of transmitters on orbiting satellites or cable television) and to maximize the sharing of scarce resources. While the television screen is not always an acceptable alternative to immediate in-person access to the instructor, effective use can often be made, in lieu of in-person appearances, of two-way communication systems, computer terminals, coordination between TV programming and local educational programming (at the local library or museum), and guided or programmed textbooks. These various instructional technologies can all enhance the educational process and even, in some instances, replace the instructor. At least in the near future, however, in-person instruction, using scarce specialists, will be necessary. In such instances, "circuit riders" should be trained, and regional scheduling should be adopted.

Recommendation#6: Regional Degree Programs. The regional internships and "circuit riders" would provide short-term instructional resources in specialized areas that most individual institutions could not afford. More extensive regional programs are also needed that lead an individual toward a professional career in an area that requires a specialized degree and/or advanced training. Such a degree and training program would be offered on a regional basis, with both financing and creditation coming from states in the region. An arrangement of this sort has recently been considered by the New England states (NEBHE) with reference to veterinary medicine. In this case, no veterinary medicine program was available in the participating states, yet no one state could either afford, or produce enough qualified students, or instate career demands to justify, starting a costly vet-med program. A single regional program, which would cost each state less money, admit only highly qualified students from several different states, and release graduates into a large regional career market, was clearly warranted.

Similar arguments can be made for other specialized and/or expensive degree or advanced training programs. Such a program should be started in areas that are of pressing concern, yet currently do not have the demands that generate sufficient capital or career potentials for a single state undertaking: e.g. system dynamics, community development and organizational consultation.

C. Meta-Institutional Programs

If the higher education community is to be significantly responsive to the needs of a society in transformation then it will have to be maximally efficient in the near future, for it will not be blessed with either generous public support or adequate public or private financing. While in the near future (especially with significant-movement toward equilibrium) there will be a leveling off or even decrease in public and private dollars to higher education, there will be an increasing demand for new programs, new personnel, and new facilities.

Institutional efficiency translates in an immediate fashion to fiscal accountability: i.e., what is the effect of a certain amount of money, spent for specific programs, on the outputs of an institution that offers these programs. An adequate assessment of costs and benefits, and an adequate response to this assessment, requires at least three different institutional operations: (1) evaluation, (2) research and (3) change.

Recommendation # 7: Institutional Evaluation. Evaluation of the effectiveness of educational institutions remains at a very primitive level, despite the competent efforts of the National Center for Higher Education Management Systems (NCHEMS). In the near future, new accounting procedures must be developed that provide for the assessment of often ill-defined variables--such as change in social attitudes and capacity for creative problem-solving--that are critical to the determination of the societal benefits derived from higher education.

Costs must also be assessed in a more comprehensive manner. Costs should be assessed on the basis not only of monetary output, but also of: (a) demands on personnel (time and energy)-- irrespective of the money given to them in wages; (b) environmental demands (physical and social); and (c) the compatibility of the program with critical social policy.

Currently, NCHEMS is defining common data elements that allow for comparisons across institutions, and is developing preliminary measures of institutional outcomes. NCHEMS also has been given several federal contracts to evaluate certain federally-funded educational projects. More institutions like NCHEMS are needed to serve as independent assessment agencies in higher education. Like NCHEMS, these agencies should provide common data bases, enabling institutional comparisons. These assessments, however, must be much more sophisticated than current NCHEMS products. Given the current influence and even power of such agencies as NCHEMS, changes in measurement criteria must be made soon if the goals of higher education are not to be subordinated to measurement devices.

Recommendation #8: Institutional Research. In the assessment of educational costs and benefits it is essential that we not only evaluate the educational products, but also learn more about the causes and consequences of specific educational processes and policies. Institutional research offices must expand their current roles by not only collecting NCHEMS-type data, and such routine data elements as enrollment, class attendence and room occupancy, but also participating in the investigation and formulation of institutional theory change.

New institutional research consortia could offer a mechanism by which institutional researchers could more readily adopt these new roles. By sharing information, trading insights, and formulating general principles, an inter-institutional research consortium might study the relationships between instructional evaluations by students (which most collegiate institutions now collect) and the percentage of time spent by an instructor in doing teaching, research and service (data which most institutional research offices now collect). This project could produce interesting data relevant to the classical debate about the effects of "publish or perish" and "interminable committee work" on classroom performance.

A consortium or network of consortia on institutional research could prvide central staff assistance in specialized areas (e.g. PPBS or system dynamics). Such an arrangement might also facilitate long term institutional planning, particularly if the consortia are regionally-based (see Recommendation #16 below).

Recommendation #9: Institutional Change. Many industrial firms have begun to recognize the need for internal as well as external (consultant) facilitators of change processes. These firms have created organizational development units within their organization and/or have called in consultants to assist in the task of increasing organizational effectiveness and job satisfaction. A similar type of resource should be available to postsecondary educational institutions, which often experience even greater demobilizing resistances to change than do industrial institutions. Several universities currently provide these services (e.g., University of Cincinnati, University of Massachusetts), but they remain the notable exceptions.

The consulting services can take a number of different forms depending on the size and mission of the institution. Following is a brief description of several different kinds of service agencies that might be created by a college, university or other postsecondary educational institution (e.g., library, museum or proprietary institution).

### a. Institutional Research and Development Unit

Many colleges and universities now have institutional research offices that enable the administrative officers of the institutions to gain access to information (e.g., space use, institutional goals, faculty activity analysis) that is useful in both short and longterm planning. As mentioned above, the institutional research office can be made a more dynamic and influential component of the institution if it incorporates broader organizational development functions and if the data collection is more closely tied to action steps (i.e., Lewin's concept of "action research").

If the institutional research office is expanded to include organizational development functions then it might provide these services (team-building, process observation, interpersonal skills training, etc.) to a variety of organizations in the institution (e.g., academic departments, student living groups and governance organizations, administrative units, planning or curriculum committees, etc.).

b. Postsecondary Educational Center

Though the academic sector of our society has been given encouragement to intensively study, advise, and critique most other institutions, it rarely chooses to study itself. Very few colleges or universities offer either undergraduate or graduate-level courses (let alone degrees) in higher or postsecondary education.

If a collegiate institution were to create a sequence of courses, possibly leading to a degree, that focused on itself, i.e., the institution, then this program might itself provide a focal point for the facilitation of institutional change. Courses could be offered in which students interview faculty and administrators concerning their values, perceptions of the institution, concepts of organizational functioning, etc., in which they would observe various groups in operation on the campus, in which they would attempt to conceptualize the norms informal structures, etc., of the institution. This data collection and analysis could, in turn, be reported back to administrators and faculty and could become the basis for significant institutional interventions. The program in higher education could also serve as an excellent training ground for future college administrators, for consultants to higher education, and for researchers in higher education. Currently there are very few, if any, institutions in the United States that prepare people in a systematic way for any of these roles (with the possible exception of the training programs for community college administrators).

c. Organizational Development Consultation Unit

Modelling the progressive industrial firm, colleges and universities might install a new unit that is specifically designed to provide organizational development services to the institution. This unit would be staffed by several full-time organizational development specialists as well as by several part-time members of the faculty who possess specific skills (e.g., social psychology, management or communication) that are applicable in organizational consultation. This consulting service would either be set in the administrative division of the institution or in the academic division. Alternatively, on several campuses, these consultation services have emerged from student counselling services as a result of expanded concepts of how the counselling center can most effectively prevent, as well as treat, personal and academic problems encountered by students.

## II. The Noncollegiate Sector of Postsecondary Education

While expanding our concept of education and learning during the transformation to an equilibrium society, it is essential that, at a very early stage, the noncollegiate sector of postsecondary education be integrally involved in any change plans and processes. This sector includes such diverse institutions as libraries, museums, symphony orchestras, corporate training programs, proprietary schools, public interest groups, churchs, and families.

A. Adult Education. Under conditions of equilibrium, with longer life spans, and fewer children, there will necessarily emerge a new emphasis on adult education. This will be particularly the case in the next 20-30 years, as the "baby boom" generation passes through adulthood.

Recommendation #10: Adult Education Alliances. Not only should there be an increased emphasis on adult education, but there should also be a concerted effort to bring better coordination and cooperation to bear upon the diverse and often fragmented enterprises that currently constitute the adult education field. We recommend a new vehicle for cooperation among the diverse adult education programs.

Adult education alliances (AEA) should be developed as autonomous units in communities throughout the country, with possible network and/or consortium arrangements being developed among AEA units from similar communities and/or geographic regions. As an example (and model) of what could be done with an AEA, the Denver Public Library (DPL) is currently conducting a "Time-A-Live" project that coordinates the activities of DPL, the Denver Museum and the Symphony Association. This project provides comprehensive cultural programs for specific times and places. A patron, for instance, might be interested in eighteenth-century Grench culture. He could participate in programs at each of the participating institutions that have been specifically designed to create a broad perspective on this particular culture. Available resources include bibliographies, books, record, exhibits, concerts and calendars of relevant, upcoming events in the Denver metropolitan area. There are twenty different study units currently available. Similar packages can be drawn up for alternative future cultures (e.g., a culture in equilibrium). Various AEA's could work cooperatively in building such a program and share a large proportion of the resources that are created or identified (e.g., bibliographies, circuit riders, mobile exhibits, interlibrary loan systems).

Recommendation #11: External Degree Programs. Given our expansion of adult education, and growing recognition that many modes of experience and training are legitimate and essential ingredients in a process of lifelong learning, it is incumbent upon the collegiate sector to recognize and credit this experience and training, and upon the noncollegiate sector to structure programs in such a way that they are compatible with these collegiate crediting arrangements.

Currently, there are a variety of external degree programs, ranging from the mass communication based "Open University" of Great Britain, to the public experimental programs of New York (Empire State) and Illinois (Lincoln State) and the established, though still controversial, "University-Without-Walls" program of approximately twenty American colleges and universities. These programs provide invaluable experience in the development of regional crediting centers to provide evaluation (examinations, interviews, portfolio inspection, etc.) of life experiences and training, leading toward academic degrees. These centers also provide career and educational counseling, educational and vacational referral services, and coordination of adult education programs, possibly in conjunction with the AEA's in the region.

The regional external degree centers reflect a centralization of crediting operations, rather than centralization of educational resources. Under this model, people would receive education through a number of different channels and media, some being formal (classroom, internships), others being informal (television, work experiences, recreational reading). Such a program of regionalization makes sense in terms not only of increased accessibility of adults to academic crediting, but also of the substitution for travel (highly energy-intensive) of better and more useful communication channels. By centralizing crediting rather than educational resources, the adult learner need not travel to receive an education, but only to receive credit for the education received at home or on the job (a yearly or even singular event).

B. Business Institutions. Presently, some of the most extensive and innovative educational resources are to be found in the business sector of our society. One international corporation, with international headquarters located in the northeast region of the United States, claims that its mid-level managers receive in-service training during their careers that is equivalent to three baccalaureate degrees. This amount of training may be atypical, but it is certainly not unique.

Unfortunately, these training and educational resources have remained essentially isolated from the mainstream of formal postsecondary education. A mutual interchange between business and educational institutions is essential for lifelong learning and for satisfying the need for extensive professional retraining and reorientation that is inherent in the transformation toward equilibrium.

Recommendation #12: Cooperative Course Offerings: Some business leaders, researchers and trainers now teach parttime at colleges and universities. This is particularly the case in many community colleges and small private colleges that are closely integrated with the local community. While, in many cases, these people are brought in to save money (less expensive than a fulltime instructor), they also provide invaluable services as knowledgeable resources that are clearly attuned to "real-life", pragmatic issues arising from their own daily activities. More individuals from business should be encouraged to teach at colleges and universities through the development of incentive systems by business firms, recognizing that the firm can benefit from the knowledge gained by the parttime teacher as he mingles with other instructors and students or through the recognition by external funding sources of the critical value of the interchange of ideas between the business and educational sector.

Alternatively, business firms could offer special courses which are available to all members of the community, and possibly available for credit through special arrangement with local colleges or universities. Such a program would benefit the firm by increasing community knowledge about, and positive attitude toward, the firm, and would benefit the community through high quality, low cost instruction.

In the opposite direction, faculty members should be encouraged to become involved with business firms not only in a consulting capacity (which usually keeps the educator one or two steps removed from the ongoing educational processes of the firm) but also as a trainer-educator. If the faculty member has received some training in adult education (as part of a comprehensive faculty development program), then he can provide valuable resources to the business firm in the design of curricula for training programs, and in the design and execution of special educational programs that expand the general capacity of the employee to enjoy a more rewarding life as well as to perform more effectively on the job.

Recommendation #13: Cooperative Internships/Sabbaticals. In line with the previous recommendations regarding student internships, it is essential that business firms recognize the advantages to them of bringing in students from colleges and universities within their region. As in the case of cooperative course offerings, the internships can provide increased community understanding and acceptance, as well as alternative perspectives that a short-term, skilled intern can uniquely provide. Conversely, the collegiate sector must work actively to make the educational/sabbatical programs for business leaders easier to initiate and more productive for both the participant and firm. Sabbaticals will undoubtedly become more attractive and acceptable as ret. aining and frequent career change become imperatives for many members of the business community.

Recommendation #14: Sharing of Physical Resources. With the rising costs of capital construction and technical equipment, many colleges and universities, as well as educational training programs in business firms, are unable to expand their educational facilities or renovate current facilities to accomodate new educational offerings. This problem can be alleviated in part through the sharing of physical resources. College courses, for instance, can be offered in the evening at local factories or offices; business computers that are used 18 hours per day for the control of production, can be programmed for educational purposes the other six hours per day. Low cost time-sharing arrangements can be made at large university computer centers with small business firms that wish to train their employees in the use of computers, but are unable to free up their own computer or afford the normal costs of computer time. Programs of cooperation in the use of high-cost physical resources necessitate new arrangements and means of sharing ideas. An Adult Education Alliance could provide such services.

C. Governmental and Public Interest Institutions. Transformation to an equilibrium society requires long-term social planning. Local, state and regional agencies, whether governmental or public interest, must be involved in this process as well as in the critical process of providing information and edcation to the general public, so that the public can critically evaluate the outcomes of social/ecological forecasting and act upon the implication of these outcomes in a thoughtful yet decisive manner.

Recommendation #16: Postsecondary Educational Forecasting. The system dynamics modeling that has produced analyses of global growth processes of industrial and national economic processes, of urban development processes, and of the dynamic behavior of several other important social,ecological and economic systems, ought now be turned to a policy-oriented analysis of the complex system of postsecondary education. Such variables as rate of student enrollment, capital investment in higher education, demographic characteristics of the student population, educational resource demands, and many others should be included in order to gauge the nature of the total system's response to alternative policies over the next two to three decades.

Unless postsecondary educational planning is more closely linked with broad economic and political planning, as can be done through a system dynamics model, it will fail to be responsive in the future to changing physical and social system conditions. Policies need to be developed which recognize the interaction between state, regional, and federal education agencies (e.g., state commissions of higher education, state chancellors' offices, regional compact agencies, USOE), on the one hand, and various general governmental planning agencies (e.g., legislative analyst offices, state budget/management offices), on the other.

Recommendation #17: Information-Dissemination and Education by Advocacy Groups. Various public interest and legislative lobbying groups that are concerned with issues related to transformation toward equilibrium must expand and improve their roles as sources of information and education. These groups might work quite effectively with newly-formed Adult Education Alliances and with long-term planning groups in government.

In addition, an increasing number of internships should be set up by higher education with public interest groups. Such internships are highly prized by students (to the extent that many students are willing to work on a volunteer basis), and pedagogically sound as training experiences for the acquisition of new roles and new skills in transformational institutions.

D. Religious Institutions. In attempting to transform our society toward equilibrium, religious institutions can play a vital educational role, particularly with reference to the clarification and development of value systems, and the creation of an expanded systemic (eco) consciousness.

Recommendation #18: Values Clarification and Development. Under the demands for transformation, most individuals will find their current value system to be constantly challenged by both other people and events. Furthermore, under demands for new perspectives and behavior, the underlying value system is often dissociated from action. Given these conditions, religious groups should be less concerned with engendering a specific value system, and more concerned with helping people to identify and to act consistently on their own personally-articulated set of values. Numerous values clarification techniques are currently being used in various educational, business and therapeutic settings. Religious institutions should adopt these procedures to their own purposes as well as develop new procedures that reflect and build on the rich symbolic heritage of the institution.

Recommendation #19: Increasing Eco-Consciousness. New conceptual frameworks or paradigms are demanded by the changing societal conditions in transformation. A new merger of eastern and western religious conceptions may enhance this change, while reducing the reliance of traditional western religions on capitalistic/mercantile models of reality.

E. Family Institutions. As the family changes its mission, becoming less concerned with economic and reproductive functions, and more concerned with interpersonal and emotional functions, it might also examine an expanded educational role.

Recommendation #20: Courses for Families: Traditional educational institutions have dealt almost exclusively with isolated members of the family, usually the children. With a new emphasis on lifelong learning, all members of the family will be involved in education. This extended educational process can be intensified by introducing courses in which all members of the family can be involved. These new educational programs, allowing participation by the entire family, should incorporate some sessions that involve only certain members of the family (e.g., sculpturing), and still others that involve the entire family. These programs might be "educational vacations", in which a family would "go to school" while participating in various recreational activities in pleasant surroundings.

Recommendation #21: Home Educational Programs. Educational television can help create the role of family as an educational unit in society while sustaining an educational environment in the home. The primary challenge to educational TV programmers is no longer one of creating visually attractive displays (this has been done with Sesame Street and Electric Company), but instead one of creating multi-sensory (visual, auditory, tactile, etc.) experiences that involve the active participation of the audience. This latter goal can be met by coordinating TV programming with other educational resources in the viewer's community (e.g., library and museum resources). An Adult Education Alliance could effectively coordinate such a project, especially if the TV programming is funneled through or developed by local media boards (a possible requirement for future cable TV companies.)

## CHAPTER FIVE: STRATEGIES FOR INNOVATION AND CHANGE

Having presented a set of recommendations for innovation and change in postsecondary education, we will now consider several strategies for implementation of these programs. These strategies incorporate estimates of the probable time needed to fully implement the program, as well as recognition of the complex interrelationship among the various recommendations. More specifically, in developing the strategies we have begun by assigning a"criterion year" to each recommendation and need which is an estimation of the year by which the recommendation can probably be fully implemented or the need essentially filled. We have also performed an impact analysis in which an estimated level of impact (0=no impact; 4=essential, enabling impact) was determined for each recommendation as it influenced each of the other recommendations and as it met specific identified needs (see Chapter 3). Tables 1-21 in the appendix summarize the estimates made for each recommendation. Tables 22-36 in the appendix present data on each need(to be included in final draft).

Several general conclusions can be drawn from these estimates and analyses:

1. Ordering of Priorities for Recommendations: As a result of the impact analysis, each recommendation was assessed for (a) its impact on the twenty identified needs, (b) its impact on other recommendations, and (c) the impact of other

recommendations on itself. Priorities were assigned to each recommendation on the basis of this impact analysis, with primary attention being given to the anticipated impact of the recommendation on needs and on other recommendations. The priorities have been listed in Table VI. Highest priority was assigned to the development of regional programs for the training and education of specialists (recommendation #6). Programs for institutional change and the formation of a new core curriculum also received high impact scores. Regional planning, professional development and training, and disciplinary reorganization were ranked four, five, and six respectively. The remainder of the priority list indicated that internships (regional, business, public interest) should be emphasized, as should the circuit rider and external degree programs. Though the Adult Education Alliance does not itself warrant high priority it is closely linked with, and in some instances enables or facilitates other high priority programs.

1. Sequencing of Recommendations. The initial estimated criterion year for each recommendation was readjusted as a result of the impact analyses in order to adequately reflect the priority assigned to each recommendation, and an ordering of events that optimizes program impact.

Following is the listing of a suggested sequence of recommendations for the collegiate sector:

1976

(Institutional Change) (#9)

Institutional Research (#8)

Regional Specialized Internships (#4)

Circuit Riders (#5)

1978

Professional Development and Training (#3)

Institutional Evaluation (#7)

Regional Specialized Programs (#6)

1980

Core Curriculum (#2)

Disciplinary Reorganization (#1)

1982

Institutional Change (#9)

The sequence reflects the fact that institutional change in collegiate institutions is an essential activity, yet is extremely difficult to achieve in a short period of time. A comprehensive change program must begin immediately in colleges and universities that wish to effectively respond to the challenge of transformation to equilibrium. This sequence also reflects the fact, however, that some programs can and should be started immediately, without the assistence of significant institutional change. The regional internships and circuit rider programs should be started within the next two years, given adequate interest and support from several colleges, universities and inter-institutional agencies (consortia, compact agencies).

The recommendation sequence is responsive to yet another issue: new core curricula can not be established without a body of faculty, community resources, etc. that have the expertise to manage these new instructional programs. Regional specialist programs are needed immediately, yet, realistically, can not be expected to be in operation until at least 1978, and producing graduates until 1980 (assuming that the first group of students would be already advanced in the new fields, needing only to fill in specific knowledge gaps, to gain an overall perspective on the field and/or to receive formal crediting for previously acquired competency). Since the core curriculum is a high priority program, it undoubtedly could be started in limited fashion before 1980. By retraining currently available faculty (Recommendation #3) and using new community resources (Recommendations #4, 12, 13, 16, and 17) an earlier start-up date is attainable.

Following is the revised schedule of recommendations made for the noncollegiate sector of American postsecondary education:

1976

Adult Education Alliance (#10)
Regional Planning (#15)
Business & Education Exchange (#12)
Public Interest Group Information and Education (#16)

Public Interest Group Internships (#17)

Family Courses (#20)

1978

External Degree Programs (#11)

Business & Education Internships (#13)

Business & Education Resource Sharing (#14)

Religious Values Clarification (#18)

Home Educational Programs (#21)

1980

Religious Eco-Consciousness (#19)

In contrast to the recommendations made for the collegiate sector of postsecondary educations, we assume that those made for the noncollegiate sector can, in most instances, be implemented almost immediately, for there is no established institution to systematically offer resistence. Nevertheless, some sequencing is probably necessary to reduce confusion and duplication of effort. For that reason, we suggest that top priority be given to establishment of adult education alliances which can provide coordination and networking functions within the community, and, with the development of consortia arrangements, provide contacts between communities and with other segments of the postsecondary education community.

Similarly, we believe that regional planning is essential at a very early date for all sectors of postsecondary education. The current methodological capabilities of the system dynamics groupsand of NCHEMS should be sufficient to ensure a productive first effort at interrelating educational factors with such other factors as population (growth and change), economic growth and decline, and changing societal values (e.g., new interest in crafts, intermediate technologies, etc.). The regional planning efforts can also provide valuable bridges between the education and business sectors, and between education and public interest groups, as each of those three institutions gain new knowledge about the interrelationship between their own activities and the activities of the others.

Those programs in the noncollegiate sector that have been set at later criterion years have not been deferred because of an inability to implement them earlier (in the case of both external degree programs, and business and education internships and sharing of resources, programs are currently underway in a number of locations). Rather, they have been deferred to ensure their success in a supportive atmosphere. The external degree programs will become extensive and regionalized only when there are effectively coordinated adult education programs to generate sufficient academic credit for a degree. The Adult Education Alliance and several of the other recommended programs should therefore precede an expanded external degree program.

Similarly, the expanded internships between business and education can probably be most successfully implemented on the basis of proven success with the less ambitious exchange of educational and training personnel. Again, in the case of scheduling extensive resource sharing between business and education, less ambitious programs should, in most instances, precede this one.

2. Estimating the Potential Impact of Recommendations on Identified Needs. The impact analysis allowed us to make a crude estimate of the extent to which the twenty identified needs could be met if all of the recommendations were successfully implemented. This crude estimate allows us to determine the extent to which our needs and recommendations have been successfully matched. Following is a listing of the total impact scores for each need, and a ranking of each need (based on its total impact score):

| Need | Total Impact Score | Rank |
|---|---|---|
| 1. Balanced Research Prior. | 23 | 17 |
| 2. New Technol. Research | 29 | 12 |
| 3. Holistic Research | 28 | 14.5 |
| 4. Soc. Sys. Transform. Res. | 35 | 8 |
| 5. Train. Prog. for Res. | 35 | 8 |
| 6. Lifelong Education | 46 | 1 |
| 7. Interdisc. Disciplines | 35 | 8 |

| | | | |
|---|---|---|---|
| 8. | New Roles for Disc. & Prof. | 40 | 4 |
| 9. | Credentials | 15 | 18 |
| 10. | Milit. & Law Enf. Educ. | 7 | 20 |
| 11. | Engagement: Aff. Action | 44 | 2 |
| 12. | Life. Plan & Management | 24 | 16 |
| 13. | Leap-frogging | 12 | 19 |
| 14. | Pilot programs | 39 | 5.5 |
| 15. | New Instit. Paradigms | 39 | 5.5 |
| 16. | New Institutions | 29 | 12 |
| 17. | Alternative Educ. Instit. | 29 | 12 |
| 18. | Educational Management | 43 | 3 |
| 19. | Educ. Inter-Institutions | 33 | 10 |
| 20. | Educ. Meta-Institutions | 28 | 14.5 |

The total impact scores indicate that we have developed a fairly well-balanced program of recommendations, impacting to a significant degree on most of the needs. Only in the case of military and law enforcement education, leap-frogging, and credentialing have we seemed to fall short. Recommendations that more directly respond to these needs will hopefully be forthcoming in future drafts of this working paper.

## Specific Strategies for Innovation and Change

Having laid the groundwork for the development of strategies we will turn to specific suggestions, using types of institutions as an organizing principle. Attention will first be directed to individual institutions in the collegiate sector.

A. Collegiate Institutions. The first ten recommendations all directly affect American colleges and universities. The last eleven items will also have a direct bearing on the operations of those collegiate institutions that wish to remain or become fully integrated in the community.

The individual collegiate institution that wishes to initiate one or more of the recommendations contained in this document will probably have to enact some form of planned institutional change. Such a program can make the institution more responsive to the significant transformations that will be needed in the near future. An effective equilibrium-oriented change program should incorporate organizational development principles, while seeking to limit growth in such areas as capital stock and energy consumption.

A professional development and training program should run concurrently with any institutional change effort, for these changes, if successful, will undoubtedly have profound implications for the roles of people in the institution, and for the skills they must employ and attitudes they must hold in filling these roles. The development and training programs should be comprehensive in nature, rather than geared toward meeting specific needs or solving specific problems. This program should be extended to administrators and staff as well as faculty, though particular attention should be given to faculty who are working in new curricular areas.

In both the institutional change and professional development programs, the leaders of the institution should call in trained consultants from outside the institution as well as make effective use of internal resource people. A national network such as is proposed below will enable these leaders to rapidly identify the type of external consultant that is needed for their specific institution. Both programs should be long-term institutional commitments with a goal being clearly established of making the program self-sustaining in terms of funds, consultation and training within a three year period. Packaged institutional change or professional development programs should be avoided. Collaborative, problem-oriented relationships with external and internal consultants are more likely to prove satisfactory.

Programs for institutional evaluation and research should accompany and reinforce the institutional change and professional development programs. Similarly, while the internship and circuit rider programs are not dependent on change and development efforts, they can help facilitate these efforts by providing faculty, administrators and staff with alternative images of what education can and, hopefully, should be and do. By starting the internship and/or circuit rider programs at an early date, an institutional leader can facilitate the implementation of the other recommendations.

Finally, consideration must be given to the core curriculum recommendation. While the change and development programs will facilitate (even enable) curricular change, there must also be a marshalling of planning and conceptual resources. A curriculum committee that significantly revises the core structure of an institution's instructional program must be provided with better guidelines than are now available of how the future may look. The regional planning program (Recommendation #15) will be of assistance. In addition, however, the committee will need an extensive, documented set of alternative futures models, together with a detailed list of institutions, roles and skills that will continue or newly emerge in the alternative future societies. The first two chapters of this working paper represents a first crude attempt at such a document. We need much better work in the near future.

B. Noncollegiate Institutions. Central coordination, through an Adult Education Alliance, is critical to success in this sector, just as there is an increased need for coordinating and network functions in the collegiate sector (consortia, metropolitan educational planning groups, state coordinating councils of higher education, regional planning agencies, national associations. etc.).

Optimally, the Adult Education Alliances should be interlinked through regional consortia, which in turn should be at least informally linked through a national network. This overarching organizational structure should not be considered a constraining force, and certainly should not become the basis for a formal, hierarchically-organized national program. Rather the consortium and network arrangements should primarily provide information flow and noncoercive coordination of activities.

Such noncollegiate educational institutions as libraries, museums, performing arts centers and historical societies should work cooperatively on the development of integrated instructional programs--especially programs that deal with alternative futures and with the issues of transformation and change. These programs might include certain elements that could be more widely distributed such as bibliographies, slide shows, movies, TV programs and audio tapes. The Adult Education Alliance might provide leadership in this area.

The development of family-based educational programs, while not a high priority, holds considerable promise. Many adults are now looking for alternatives to the traditional vacation, as well as alternatives to the traditional educational experience (classroom, television, movies). A family program which is exciting and involving (i.e., experience-based), as well as being rich with new information and practical ideas for change, will be successful, especially with the availability of some startup funds and/or risk capital. Followup to such an educational/vacation experience might include cassette TV programs, packaged simulations and structured exercises that can be done at home, and periodic discussion meetings with other participating families (an extension on the "Great Books" program emanating from the University of Chicago). Such a followup program could provide an excellent opportunity for experimentation with new, comprehensive home education programs (Recommendation #21).

C. Inter-Institutions. Throughout the previous and present chapter we have described programs that require cooperation, coordination and information-sharing across institutions. The intersect organizations that provide these inter-institutional services will become increasingly important in the transformation toward equilibrium. We specifically suggest that current regional compact agencies (WICHE, SREB AND NEBHE) implement specialized internships (Recommendation #4) and specialized graduate programs in such fields as system dynamics, organizational development and community development (Recommendation #6). Recognizing that such programs, when initiated by a regional agency rather than one or two institutions or states, takes a rather long time to implement, it is imperative that action be started in the immediate future on these projects. Many other recommendations must await the production of competent people in critical new fields. Unless regional agencies assume leadership in this effort, a critical delay period can be anticipated, for very few educational institutions (especially in states with low population density and a small fiscal base) will be able to afford these programs.

In areas of the country where there are no regional compacts, such agencies should be encouraged. The era of prosperity and, hence, autonomy for the public educational giants of the Midwest or the private, ivy-covered citadels of the East is now past. In both of these regions new efforts at cooperation should begin, for the sake of both the people residing in the region, and of American post-secondary education in general which continues to look upon institutions in these two regions as models for emulation.

Similarly, the consortium movement should be encouraged, for such arrangements reduce unnecessary duplication of resources, and offer the potential for unique instructional programming (e.g., the College Center of the Finger Lakes environmental studies program in the Bahamas.). The circuit rider program could quite easily be conducted through a consortium of colleges and/or universities. The circuit rider program could be effectively implemented through a cooperative effort between a consortium of colleges and a consortium of adult educational agencies (i.e. Adult Education Alliances).

D. Meta-Institutions. In this category we propose a new institution and a new network. The institution would meet the meta-institutional needs described in the previous chapter (Institutional Need #6). It would serve such functions as: (1) research and development with reference to the implications of alternative futures and, more specifically, growth policies, on various educational institutions in our society, (2) consultation and training for institutions that wish to engage in significant transformation leading toward equilibrium, (3) network management, i.e. facilitating the establishment and operation of networks, especially in post-secondary education and among meta-and inter-institutional agents and agencies, and (4) identification and distribution of instructional materials that are particularly relevant to the study of equilibrium, the causes and consequences of growth, and the processes of transformation.

High priority in terms of meta-institutional networks must be given to organizational consultants and trainers. Currently, no more than 75-100 individuals in this country are actively involved in the systematic use of applied behavioral science technologies (e.g. organizational development, conflict management, values clarification) for institutional change or professional development in the collegiate sector. A national network is needed by consultants and trainers for information sharing, training of new consultants, continuing education, centralized referral services for potential clients, and increased understanding of the technologies among leaders in the collegiate sector.

E. Foundations: We conclude this paper by addressing ourselves to public and private funding sources. We suggest that serious consideration be given to financing the initial development, and in several instances, continuing operation of the programs recommended in this paper.

More specifically, we recommend that private foundations provide seed money to regional agencies and consortia to encourage them to embark on the several new programs described above. We would also encourage private foundations to work actively for the creation of the Adult Education Alliances and their associated consortia and network arrangements. Finally, we suggest that private foundations provide financial assistance to institutions, consortia and agencies that are attempting to develop and distribute instructional materials related to the issues addressed in the first two chapters of this paper.

Governmental agencies should provide money to institutions for comprehensive institutional change and professional development. Even a small amount of money directed toward this type of activity would represent a significant departure from the expected, and might encourage greater initiative on the part of the institution to develop a program that is eventually self-sustaining.

Finally, state and federal governmental agencies should encourage regional and national planning for postsecondary education, providing a broad perspective on the role of educational institutions in future societies. Only through comprehensive, long-term planning programs, embracing all sectors of society, can we begin to control a global system that is in desperate need of transformation toward equilibrium.

COMMENTS BY: Dave Steffenson of University Of Wisconsin Green Bay

I have finished reading your report and find it to be an exciting and extremely provocative document. Its comprehensiveness (in outline form) and scope is awe-inspiring, as well as very helpful to me in sorting out directions for the future. It needs wide dissemination urgently!

Of course, I found many references unclear due to unfamiliarity as well as frustration in not being able to follow-up suggestions in more specific detail. It also suffers from lack of bibliographical references which I'm sure will be corrected in the final draft. Some specific comments on specific points are enclosed.

I feel this is a very suggestive and important document for UWGB. I was struck to see that many of your proposals are already part of UWGB, and others are not a part as yet but could be easily carried out on the basis of the academic plan already established. The paper allowed me to see how far we have come in comparison to most universities, yet it also showed me how far we have to go in making the academic plan a concrete reality. For example, I've already shared a couple of pages on "core curriculum" with a member of our freshman Liberal Education Seminars committee.

P. 10 -- Roles seemed somewhat vague to me. We already have to be that flexible in our present growth society. Also, my understanding of Erikson is that while the adolescent identity crisis receives major attention, that some kind of identity crisis is inherent in every developmental stage (e.g., middle-age scaling down of dreams, etc.).

P. 11 -- Sexuality -- also incomplete. Perhaps should couple this paragraph with the one on p. 15 on the family, and expand a bit on other unconventional roles such as extended families, communes, single adoptive parents, role reversals, etc. Does not recognize women's movement as a profound force for social change currently operating.

P. 12 -- Conflict -- your emphasis on conflict resolution is good, but the ethical problems and social problems that your model touches upon are profound and vast. Most conflict resolution now is in the group dynamics mode. Your model raises profound conflicts of nationalism, economic warfare (oil, food), and nuclear warfare. Is dialogue enough? Are there ways to get at that level of conflict other than muddling through pragmatically as we are now without the necessary long-range view?

P. 20f. -- Religion -- your comments are well-taken, but there are other dimensions. A basic reason why the needed value changes are so difficult is that we define ourselves and are defined by myths and symbols of which we are hardly conscious, yet hold great sway over us; (see Robert Bellah, "Civil Religion" and Paul Tillich on symbolism). The myths and symbols of civil religion, and this category includes religious institutions but transcends them, control perceptions. Most social change

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COMMENTS BY: Dave Steffenson of University Of Wisconsin Green Bay

proposals do not dig deeply enough to get at this level of existence, yet I'm convinced they are perhaps the most powerful forces in our lives and can be either positive or negative. And religion, in its celebrative and integrative aspects, can be helpful in getting at them. I'd quarrel with some of your oversimplifications on religion if this were a more detailed work, but they are adequate in context.

P. 25 -- Institutions -- Your list does not include (1) Familial and (2) Associative, formal groups such as lodges and informal groups that do not fall into the other categories. Could a category VI, Familial -- Associative,be added?

P. 31 -- Transformation -- New Paradigm -- "Goals" -- No. 1. The word efficiency is the operating principle through which the old paradigm maximizes production at minimal financial cost; and efficiency has been a prime value of the old paradigm. I understand E. F. Schummacher, for example, to be saying we must become less efficient in order to have more humane systems. What does "efficiency" mean in your new paradigm? I sense an ambiguity over this value all through your paper in that efficiency is a prime value in systems dynamics, yet efficiency as we have known it runs counter to the type of humane system you envision for the no-growth society. That word needs much sharper definition.

P. 39 -- I was really struck by Table IV from the standpoint of the campus ministry. The entire recent literature on the role of campus ministries, and the self-understanding of most of my colleagues and I, is precisely that which you envision here. We may be the only profession in higher education that is precisely charged to do what is envisioned here and are doing their best to carry out these roles. I think a very fruitful dialogue and discussion could be carried on between no-growth transformation people and the campus ministry.

P. 76 -- Life work planning -- it is interesting to note that United Ministries in Higher Education, my own national campus ministry structure, has an ambitious project as well as having developed probably the most effective methodology for doing this. It has been funded for $131,000 by the Lilly Endowment and is headed by Richard Bolles, 627 Taylor Street, San Francisco, Calif. 94102

P. 117 -- Religious Institutions -- You overlook another strategic role for religious institutions. No other institution in our society is more intimately involved with family life and relationships than religion, and it is in the family where most of the values and life-styles so troubling to a shift to no-growth are forged. Religion could be a strategic access to that area of living.

COMMENTS BY: Martin Kaplan of Aspen Institute for Humanistic Studies

I have just finished reading your draft of "The Implications of Growth Policy for Postsecondary Education: A Model and Proposed Course of Action,".

I found it exciting and provocative and should preface any comments by saying that it represents, to me at least, a penetrating and fresh approach to a number of key educational problems, especially because its holistic perspective forces a reader to think about all the issues it raises at once, to juggle rather than absorb passively. I was greatly impressed by the material on pp. 42-115, especially the treatment of interdisciplinary programs; you have mapped out an ambitious and thorough program which would be difficult to be a responsible thinker in the field of post-secondary education and ignore.

This much said, though, I fear I have to differ sharply with the very theoretical structure which generates that section. That is, I find the bulk of the ideas which lead you to suggest the reforms that you do urge to be inadequate on several grounds. This is ironic, for, as I said, I do concur in the direction toward which you would like to move. Were I to engage in the (presumptuous) imaginary exercise of reworking your draft, I would revise the vision of society which leads to the reforms you picture extensively.

I am not at all arguing with the Limits to Growth premises. You begin quite properly by asking for an acceptance of them, and this I readily extend. But I do think that your social analysis is ultimately little more than a reworking of bourgeois liberalism with a superadded change of heart. You posit a society of virtuous men, never stopping to consider the possibility that institutions exist to perpetuate vested power interests rather than serve the common weal. Your reforms are addressed to an audience that read Rousseau as a contemporary, rather than to the far less naive polis of today. You have little traffic with the vision that regards the social contract and the spectre of positive change as a gesture of innoculation, a vaccine against the far more sweeping demands which might be made by citizens whose thoughtful senses of inherent systemic corruption were bent toward world-reform. Your simplistic and cavalier rejection of all but a liberal-transformer model can be read as self-legitimizing and self-serving: like Plato and the philosopher-kings, you conclude that the most needed personnel of the future are those whose perspective and social roles are most like your own.

There is enormous arrogance behind a sentence like "Authority is based on integrity, credibility and competency." Arrogance, because a vision of the world which now has wide currency holds that authority is, rather, theft (i.e., power); that terms like "integrity, credibility,

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COMMENTS BY: Martin Kaplan of Aspen Institute for Humanistic Studies

and competency" do not define ideals toward which all reasonable men might reasonably aspire, but point instead toward exploitative hegemonies and honorific claims of legitimacy. Arrogance, because whatever one's vision of Marxism, the least one can do in its wake is to consider the vested ideological determinants which permeate one's own framework.

A self-consciously self-critical ideology is, I think, the most central absence in your draft. The cybernetics jargon and systemsese (implicitly) construct a platform outside of the system, purporting to analyze the values inherent even in your own stance. But how reasonable is this? Instead, you might consider an experiment in dialectical thinking, might try refuting your own values, might see in what ways they are not transcendant to the framework but rather historically and economically determined. I very much like the society which your corriculum and reforms would engender, but I am loathe to pledge my allegiance to anything remotely resembling the repressive clarity of the model that gives rise to them.

Is all this unfair? Probably, but I felt that I had to say it. I am reacting, of course, not only to your draft, but to its congeners in the futures field. My criticism is pig-headed and neo-Luddite, no doubt, but I wouldn't feel responsible unless I indicated my deep mistrust for any analysis of humans and institutions which did not take full account of the intransigencies of human nature and the economic and ideological infrastructures which human institutions are often designed to mystify and protect.

COMMENTS BY: William D. Weir, Associate Professor of Chemistry, Reed College

From my reading of the manuscript I have a number of reactions, most of them very favorable.

As will be quite clear in any case, my interest in Forrester's and Meadows' simulations is only slightly more astute than that of an informed layman. At the same time, however, many of my current research interests conform to an embracing description as applications of mathematical systems analysis in chemistry and physics, and so modelling and simulation, as guides to inquiries about the real world, are very much a part of my professional life, my everyday thinking. It may be for this reason that I found the tone and direction of the report so congenial; my view of our society's current circumstances would condition this even if it were not so natural.

From my perspective as a citizen, our societal crisis reflects most indelibly the urgent and long-unrecognized need for broadly-based planning of objectives (_and_ evaluative mechanisms) in the direction of change. To address this need will call upon a new style of leadership requiring both greater analytical skill and more creative insight from our leaders than the level to which we (and they) have been accustomed. I take it that it is to the specific problem of providing that quality of leadership that your report is addressed. You have raised numerous tangential issues, most of them important and all of them fascinating, but this point seems to me to deserve clear primacy.

As a scientist and as an educator I believe that these skills (and they _are_ teachable skills) are shaped by continued analytical focus on certain types of materials found most commonly in science, mathematics, and philosophy as disciplines, and most sharply in _critical_ endeavor. Education along these lines, in real-world classrooms and laboratories, often is "training" in the narrowest sense; your report appears to identify the lowest-common-denominator of practice with prevailing practice at many points, and it suggests in indirect ways that the ideal is simply not attainable. I would, I think, underscore more heavily that well-chosen and properly taught materials from existing academic disciplines are the cornerstones of the analytical skills upon which good decision making is based.

Beyond this, you have raised a number of interesting questions. Education in simulation and modelling _per se_, in algorithm design, in information structures, might be a potent instrument for interdisciplinary generation of materials comparable in focus to those of traditional disciplines. Certainly, direct educational experience in the use of experimental projective techniques could provide a radically new perspective for most undergraduate students. The means by which this could be done are not, in the specific, clear to me, however this does seem to be an area where federal "pump-priming" might be very effective. The possibilities for generating "inter-disciplinary science courses" for non-scientists around these related themes is immensely exciting as a prospect.

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COMMENTS BY: William D. Weir, Associate Professor of Chemistry, Reed College

Another element of the leadership equation is the capacity to function analytically in unfamiliar territory, and here the only comment I can offer is to emphasize the importance of science education for all students. More concern ought to be given by science educators to the design of courses dealing with "new technologies", not only for their descriptive value to future decision makers but simply to develop a language-competence and a self-confidence that one could deal with the "experts". I suppose that we, as educators, should devote more thought to the breaking down of "expertise barriers".

As a final shot on the subject of society and leadership, I would suggest that much more attention be paid by all of us to playfulness and to gaming as a teaching/learning tactic. The computer has a very much more pervasive role to play in all of this than it has played in the past. Real interaction with the computer requires graphic input-output, and the technology for achieving this at moderate cost is only now becoming available. Its widespread introduction on campus and at home may make modelling of situations as commonplace for young adults as modelling in clay was for them as children.

In reviewing your draft report I find myself in sympathy with most of your suggestions for institutional reform. You are right, certainly, in suggesting that local customs and competences will be major influences in shaping reforms. At Reed, for example, where we are accustomed to doing things in year - long blocks with very tight internal organization, the "one-to-four week instructional modules" which you suggest would be open to criticism for lack of "intellectual integrity", no matter how tightly-constructed they were. Reed's local need, then, in keeping with its customs, is for the design of a new metadiscipline which would provide a superstructure within which the desired constellation of materials, or even "modules", might be gathered.

Your report correctly directs a good deal of attention to the questions of institutional and societal support for the program of innovation, should I say evolution, which the report advocates. I would emphasize that government support for systems research, directed toward the development of new modalities, should be carried out much more at university centers than at "think tanks". We are all aware of the specific purposes which the government has found for a good deal of its analysis and can appreciate, or abhor, the circumstances of its use/misuse, in cloaked surroundings. We should take care, I think, to segregate the sorts of research that you would support from that activity. Further, I heartily agree on the need for more "holistic" research (although I should rather have some other term for this sort of interdisciplinary cooperative activity). A major problem here will be to convince funding sources that such collaborative research should be based on the skills, and not necessarily only the experience, of the participants; in my experience this would run almost exactly counter to current practic.

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COMMENTS BY: William D. Weir, Associate Professor of Chemistry, Reed College

Through all of this the most pressing need is for a large body of analytically-capable and insightful academicians with a clear vision of real-world problems, with an appropriate distribution of professional expertise, and with speelbinding presence.

I found your "instructional competence" argument (page 94 of the draft report) to be somewhat weak but, by extension, perhaps not so weak after all. It is certainly true that most academics (whatever their strengths as selected from the above list) suffer as their greatest weakness a lack of experience in the real-world circumstances which your reforms would have them describe. You acknowledge, correctly, this same lack in students as you recommend internships, pages 98 to 99, for them. In terms of the student proposal my first reaction was that if collegiate instruction were *really* effective and interesting, the internship experience could as easily be deferred until after graduation. Given the real world efficiences of the students' mentors, internships may indeed be useful, but *if so*, they would be immensely *more* useful for faculty. It seems to be that the regional interests of your report might be very well-served by suggestion that a sabbatical placement service be coordinated regionally, in our case by WICHE. Were all faculty members really "tuned in", I should like to think that students would feel that they could be more fully informed through the informed eyes of their instructors than from the substitution of academic-year internship activity for intensive and closely-focused classroom work. Apart from this trivial reservation, I found that your recommendations hold up remarkably well.

Overall, it seems to me that the report blends a social psychologist's sensitivity to issues of organization and interaction and the public policy concerns of a systems programmer; the report is its own best evidence that a blending of disciplinary competences can be immensely productive. I need hardly say, I suppose, that I believe this to have been an immensely-worthwhile undertaking. I hope that your report will be widely circulated.

## Working Paper

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